DOCUMENT RESUME

ED 174 255 IR 007 539

TITLE	Federal Laboratory Consortium Resource Directory.
INSTITUTION	Federal Laboratory Consortium, Washington, D.C.
SPONS AGENCY	National Science Foundation, Washington, D.C. Office of Intergovernmental Science Programs.
PUB DATE	Sep 78
CONTRACT	NSF-77-047
NOTE	391p.
EDRS PRICE	MF01/PC16 Plus Postage.
DESCRIPTORS	*Federal Government; *Laboratories; Research Projects; *Sciences; *Technology; Technology Transfer

ABSTRACT

Designed to bridge the communication gap between the Federal Laboratory Consortium (FLC) and public and private sectors of the country, this directory has been prepared as a compilation of scientific and technical research and development activities at federal laboratories, which are directing technology transfer efforts toward increasing the use of their research results by decision makers and operational agencies in the public and private sectors. The directory is organized in three parts: Part I contains a map indicating the various regions of the FLC, an alphabetical listing (by abbreviation) of the member laboratories, a list of participating laboratories/contacts by geographic region, and a list of the CONTAC (Contacts for Technological Area Coordination) laboratories. An alphabetical listing of FLC laboratories provides quick cross reference for the following sections, and a list of CONTAC Laboratories indicates the primary laboratory that may be contacted for each major application area. Part II is a rundown of the major application areas and the laboratories with expertise in these areas. Information sheets for each laboratory indicate specific scientific and technological areas of expertise and the contact person for that facility. Finally, Part III provides examples of laboratory technology transfer projects in a majority of the scientific and technological activities. (Author/JD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED174255

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

FEDERAL LABORATORY CONSORTIUM

RESOURCE DIRECTORY

SEPTEMBER 1978

Prepared by the

FEDERAL LABORATORY CONSORTIUM
WITH THE SUPPORT OF THE
INTERGOVERNMENTAL SCIENCE AND PUBLIC TECHNOLOGY DIVISION
OF THE
NATIONAL SCIENCE FOUNDATION

NSF-77-047

IR007539

DISCLAIMER

It is not the intention of the Federal Government, nor the Federal Laboratory Consortium (FLC) to compete with industry in the supply of services to state and local governments. Rather, the Consortium encourages partnerships with industry in solving the problems of state and local governments. It is the intention of the Consortium to make its resources available to industry as well as to state and local governments and Federal agencies. To the extent that these provide new product or services opportunities for industry in either private or public markets, industry is encouraged to avail themselves of the Federal R&D resources. In fact, the effective transfer of Federal technology to state and local governments requires that the technology ultimately be available commercially.

INTRODUCTION

Our nation is currently facing a multitude of social and economic problems that require immediate solutions if our standard of living is to remain at its present level. The energy crisis, unemployment, high prices, and many other national concerns, which are equally as meaningful in keeping this nation strong, face all levels of government. An over-abundance in some areas and deficiencies in others provides the fuel for continued unrest and uneasiness in the minds of many. This country's overpowering craving for the best of everything has created problems that require immediate solutions. Rapid changes in public needs and private wants have brought about critical intergovernmental issues. The costs associated with solving these issues is extremely high and, in many instances, requires the use of high technology.

Solutions to the nations's many problems must be sought from every available resource; i.e., the federal government, industry and universities. Many solutions can be found through the proper utilization of existing and developing science and technology resources. During the past decade we have invested billions of dollars in research and development (R&D). A significant portion of this R&D was accomplished by the laboratories of the federal government. These laboratories represent a source of technology that, when properly mobilized, could possibly provide the solutions to many of our nation's problems.

There are many reasons which, when combined, provide the rationale for using federal laboratories as a technical resource. One predominates: access to existing technologies, facilities, equipment, etc., for use by state and local governments to help solve the nation's problems represents a greater return on the taxpayer's investment in science and technology through more effective primary and secondary use of R&D results.

State and local governments are aware that many of their problems can only be solved through use of science and technology. However, state and local government agencies cannot afford to invest large sums in R&D and, therefore, it is not a high priority item in their budgets. Federal government laboratories may not have the technology needed by these government agencies to solve all their problems, but substantial public investment in R&D has produced technologies that could, with suitable adaptation, fill important gaps.

If federal technology can increase the productivity of state and local government, industry can also benefit by serving as the continuing commercial supplier to state and local governments.

The federal laboratories are presently accountable to many federal government agencies. There is no formal integrating management system within the federal laboratories to ensure that the technology transfer and utilization process is coordinated and productive. There is, however, an

1

informal Federal Laboratory Consortium for Technology Transfer which, to date, consists of more than 180 of the largest federal government laboratories and centers from a number of high technology agencies. The Division of Intergovernmental Science and Public Technology of the National Science Foundation and the Naval Weapons Center, China Lake, are providing resources which make possible operation of a Secretariat in support of Consortium activities.

Although there are many definitions of technology transfer within the Federal Laboratory Consortium, technology transfer is generally described as the process by which existing knowledge, facilities, or capabilities developed under federal R&D funding are transferred to fulfill actual or potential public or private needs.

The purpose of the Consortium is to increase the use of these laboratories' unique technical expertise and R&D products toward the solutions of problems facing our government agencies and private industries. This technology transfer program emphasizes person-to-person communications between the users and suppliers in the civilian sector and the resource people in the federal laboratories. The development of a well-organized information system and the continuous involvement of the users and suppliers in the problem definition and transfer process along with discrete use of linking agents, or technology transfer "brokers", to bridge the communication gap between researchers and users represents the core program activity.

It is planned to update this Resource Directory annually. If recipients do not receive their updates, they should contact:

George F. Linsteadt
Naval Weapons Center
Code 3203
China Lake, CA 93555

HOW THE FEDERAL LABORATORY CONSORTIUM CAN HELP YOU

Within the Federal Laboratory Consortium, technology transfer is accomplished in a variety of ways. One approach is in the form of performing civilian-oriented R&D work by one of the DoD Consortium laboratories with funding provided by the requesting institution such as federal, state or local government agencies. These R&D projects are directed towards application to civilian problems, but the solutions are based upon earlier research performed for mission-oriented purposes. Thus, the American taxpayer derives double benefit from the military R&D expenditure. Other members of the Consortium, such as DOE or EPA, are chartered and funded to specifically work in the civilian area. Therefore, they are directing their technology transfer efforts toward increasing the use of their research results by decision makers and operational agencies in the public and private sectors.

In addition to performing R&D activities and pushing for greater use of their R&D products, the Consortium transfers its technology in other ways. Consortium representatives assist state and local government agencies in a variety of non-refundable ways, such as serving on scientific advisory boards, acting as consultants to specialized groups (e.g., law enforcement, pollution control agencies or fire prevention committees), providing library services and identifying sources of surplus government equipment.

One major service provided by the Consortium is in the area of brokerage. Because of the nature of these activities, the Consortium representatives are frequently exposed to new technologies developed by private enterprise, state or local governments, or by another federal laboratory. Therefore, these technology transfer coordinators can serve as "technology brokers" by bringing together the individual or agency that has a problem or need with those who have already solved it or who at least are working in the area. This broker service can be especially useful for local governments who are often unaware of the scientific support available in the federal laboratories.

Private industry can also benefit from the Federal Laboratory Consortium. For example, through the acquisition of government patents originating from these laboratories, a private company can produce and sell a product in the commercial marketplace without having to expend funds for basic R&D. Perhaps most frequently, industry can benefit by becoming the continuing supplier of a service, process, or product initially demonstrated as satisfying a need by one or more of the Consortium laboratories.

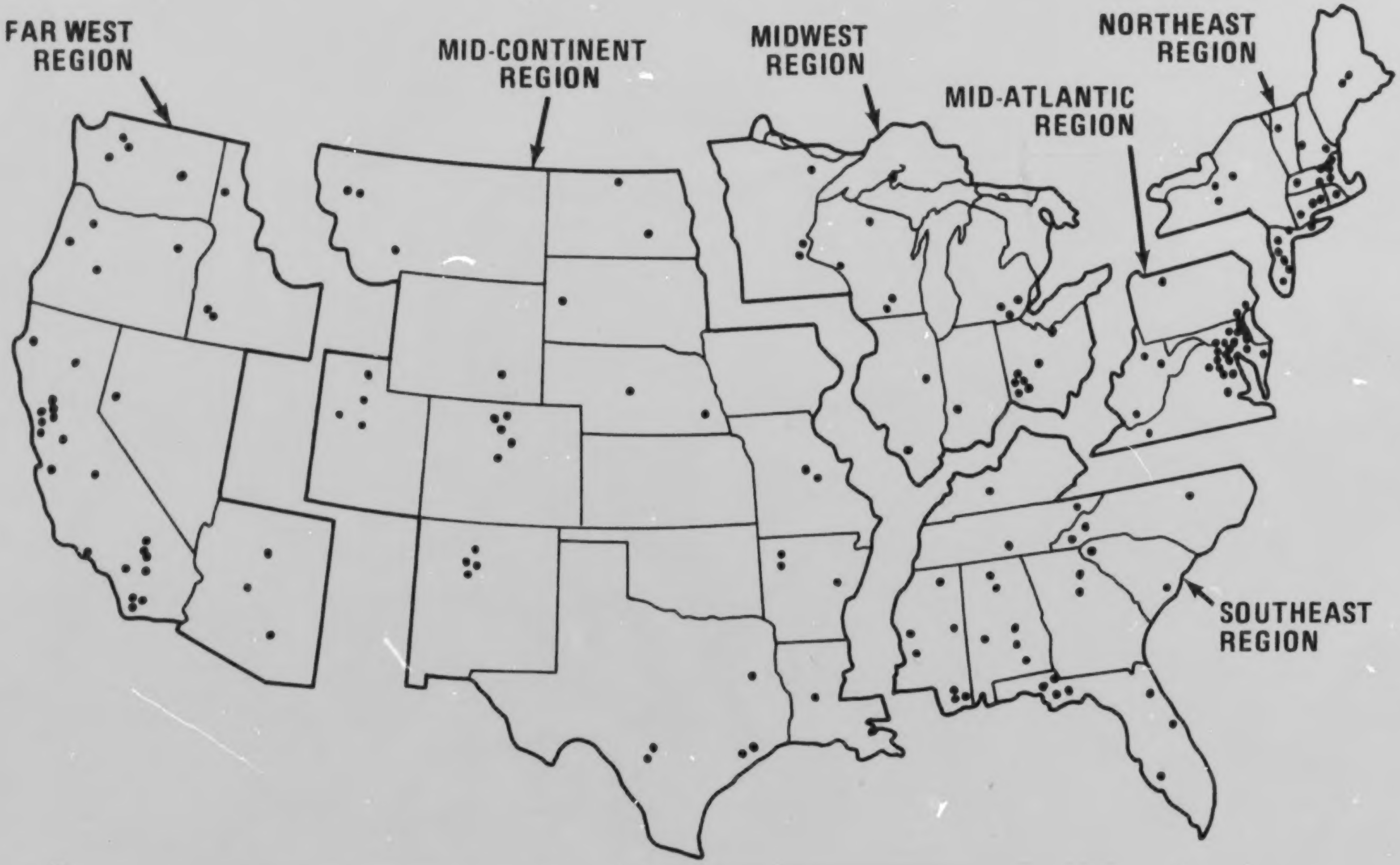
How can the Federal Laboratory Consortium help your city department, county agency, state organization, or federal agency? What assistance can the Consortium give to your Company? It is impossible to say unless there is a person-to-person contact between yourself and a member of the Consortium. The Federal Laboratory Consortium believes that greater utilization of the federal R&D dollar must be realized. This can be done by sharing the existing technology of the federal laboratories and the expertise of the Consortium representatives.

You may contact the Consortium laboratory representative nearest to you or contact the permanent Washington representative located in the Office of Intergovernmental Science and Public Technology, National Science Foundation who maintains continuing contact with technology transfer in other federal, state or local agencies as well as in private industry and assists in policy development relating to matters concerning the Consortium. Write or call the Federal Laboratory Program Manager, Room 1101, National Science Foundation. 1800 "G" Street NW, Washington, D.C. 20550 (Telephone: 202-634-7996).

To bridge the present communication gap between the Consortium and you a mechanism is required to provide you with information on the resource capability that exists within the federal laboratories. The Federal Laboratory Consortium Resource Directory was designed for this purpose. This directory has been prepared as a compilation of federal laboratory scientific and technological activities as a function of facilities with a selection of typical technology transfer efforts. Future updates will consist of new Consortium members and their addition of scientific and technological activities along with technology transfer program descriptions.

In section I, you will find a map indicating the various regions of the FLC, an alphabetical listing (by abbreviation) of the member laboratories, a list of participating laboratories/contacts by geographic region, and a list of the CONTAC (Contacts for Technological Area Coordination) laboratories. The alphabetical listing of FLC laboratories is provided for quick cross reference with following sections. The CONTAC Laboratories list indicates the primary laboratory that may be contacted for each major application area. Section II is a rundown of the major application areas and those laboratories with expertise in these areas. This is followed by information sheets for each laboratory indicating specific scientific and technological areas of expertise along with the contact person for that facility. The block in the upper right hand corner indicates the laboratory abbreviation and region for easy cross reference with section I. Finally, section III provides examples of laboratory technology transfer projects in the majority of the scientific and technological activities.

FEDERAL LABORATORY CONSORTIUM


FAR WEST REGION
MID-CONTINENT REGION
MIDWEST REGION
MID-ATLANTIC REGION
NORTHEAST REGION
SOUTHEAST REGION

LABORATORY
ABBREVIATION GUIDE

Organization		Region
Abbreviation	Full Title	
ADPG	U.S. Army Dugway Proving Ground, Dugway, UT	Mid-Continent
AFAPL	U.S. Air Force Aero Propulsion Laboratory, Wright-Patterson AFB, OH	Midwest
AFAL	Air Force Avionics Laboratory, Wright-Patterson AFB, OH	Midwest
AFGL	U.S. Air Force Geophysics Laboratory, Hanscom AFB, Bedford, MA	Northeast
AFML	Air Force Materials Laboratory, Wright-Patterson AFB, OH	Midwest
AFWAL	U.S. Air Force Wright Aeronautical Laboratory, Wright-Patterson AFB, OH	Midwest
AFWL	U.S. Air Force Weapons Laboratory, Kirtland AFB, NM	Mid-Continent
AMD	U.S. Air Force Aerospace Medical Division, Brooks AFB, TX	Mid-Continent
AMMRC	U.S. Army Materials and Mechanics Research Center, Watertown, MA	Northeast
AMRDC	U.S. Army Medical Research and Development Command, Frederick, MD	Mid-Atlantic
ARC	Ames Research Center, Moffett Field, CA	Far West
ARRADCOM	U.S. Army Armament Research and Development Command, Dover, NJ	Northeast
BIFC	U.S. Forest Service, Boise Interagency Fire Center, Boise, ID	Far West
BNL	Brookhaven National Laboratory, Upton, NY	Northeast

10

Organization		Region
Abbreviation	Full Title	
CEC	U.S. Air Force Civil Engineering Center, Tyndall AFB, FL	Southeast
CEEDO	Air Force Civil and Environmental Engineering Development Office, Tyndall AFB, FL	Southeast
CEL	Civil Engineering Laboratory, Naval Construction Battalion Center, Port Hueneme, CA	Far West
CERL	U.S. Army Construction Engineering Research Laboratory, Champaign, IL	Midwest
CGRDC	U.S. Coast Guard Research and Development Center, Avery Point, CT	Northeast
CRL	U.S. Air Force Cambridge Research Laboratory, Cambridge, MA	Northeast
CRREL	U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, NH	Northeast
CSL	Chemical Systems Laboratory, Aberdeen Proving Ground, MD	Mid-Atlantic
ECL	U.S. Army Electronic Command Laboratories, Fort Monmouth, NJ	Northeast
ERL	Environmental Research Laboratory, Narragansett, RI	Northeast
ETL	U.S. Army Engineer Topographic Laboratories, Fort Belvoir, VA	Mid-Atlantic
FBI	Federal Bureau of Investigation Laboratory, Washington, D.C.	Mid-Atlantic
FFL	Forest Fire Laboratory, Riverside, CA	Far West
FHRS	Fairbank Highway Research Station, McLean, VA	Mid-Atlantic
FRC	Hugh L. Dryden Flight Research Center, Edwards, CA	Far West

Organization		Region
Abbreviation	Full Title	
FSR	U.S. Forest Service, Research, Washington, D.C.	Mid-Atlantic
GSFC	Goddard Space Flight Center, Greenbelt, MD	Mid-Atlantic
HDL	Harry Diamond Laboratories, Adelphi, MD	Mid-Atlantic
HEL	U.S. Army Human Engineering Laboratory, Aberdeen Proving Ground, MD	Mid-Atlantic
HRL	U.S. Air Force Human Resources Laboratory, Brooks AFB, TX	Mid-Continent
INT	U.S. Forest Service, Intermountain Forest and Range Experiment Station, Ogden, UT	Mid-Continent
ITS	Institute for Telecommunication Sciences, Boulder, CO	Mid-Continent
JPL	Jet Propulsion Laboratory, Pasadena, CA	Far West
JSC	Lyndon B. Johnson Space Center, Houston, TX	Mid-Continent
KSC	Kennedy Space Center, Kennedy Space Center, FL	Southeast
LaRC	Langley Research Center, Hampton, VA	Mid-Atlantic
LASL	University of California Los Alamos Scientific Laboratory, Los Alamos, NM	Mid-Continent
LBL	Lawrence Berkeley Laboratory, Berkeley, CA	Far West
LeRC	Lewis Research Center, Cleveland, OH	Midwest
LLL	Lawrence Livermore Laboratory, Livermore, CA	Far West
MDL	Medical Devices Laboratory, Washington, D.C.	Mid-Atlantic

Organization		Region
Abbreviation	Full Title	
MERADCOM	U.S. Army Mobility Equipment Research and Development Command, Fort Belvoir, VA	Mid-Atlantic
MIRADCOM	U.S. Army Missile Research and Development Command, Redstone Arsenal, AL	Mid-Atlantic
MSFC	George C. Marshall Space Flight Center, AL	Southeast
NADC	Naval Air Development Center, Warminster, PA	Mid-Atlantic
NAEC	Naval Air Engineering Center, Lakehurst, NJ	Northeast
NAFEC	National Aviation Facilities Experimental Center, Atlantic City, NJ	Northeast
NBL	Naval Biosciences Laboratory, Oakland, CA	Far West
NBS	National Bureau of Standards, Washington, D.C.	Mid-Atlantic
NC	U.S. Forest Service, North Central Forest Experiment Station, St. Paul, MN	Midwest
NCSL	Naval Coastal Systems Laboratory, Panama City, FL	Southeast
NE	U.S. Forest Service, Northeastern Forest Experiment Station, Broomal, PA	Mid-Atlantic
NEODC	Naval Explosive Ordnance Disposal Center, Indian Head, MD	Mid-Atlantic
NHRC	Naval Health Research Center, San Diego, CA	Far West
NIOSH	National Institute for Occupational Safety and Health Cincinnati, OH	Midwest

13

Organization		Region
Abbreviation	Full Title	
NOO	U.S. Naval Oceanographic Office, Bay St. Louis, MS	Southeast
NOSC	Naval Ocean Systems Center, San Diego, CA	Far West
NPRDC	Naval Personnel Research and Development Center, San Diego, CA	Far West
NPS	Naval Postgraduate School, Monterey, CA	Far West
NRDC	U.S. Army Natick Research and Development Command, Natick, MA	Northeast
NRL	Naval Research Laboratory, Washington, D.C.	Mid-Atlantic
NSRDC	David W. Taylor Naval Ship Research and Development Center, Bethesda, MD	Mid-Atlantic
NSTL	National Space Technology Laboratory, Bay St. Louis, MS	Southeast
NSWC	Naval Surface Weapons Center, White Oak, Silver Spring, MD	Mid-Atlantic
NUSC	Naval Underwater Systems Center, New London, CT	Northeast
NVEOL	U.S. Army Night Vision and Electro-Optics Laboratories Fort Belvoir, VA	Mid-Atlantic
NWC	Naval Weapons Center, China Lake, CA	Far West
NWSC	Naval Weapons Support Center, Crane, IN	Midwest
ORNL	Oak Ridge National Laboratory, Oak Ridge, TN	Southeast
PNW	U.S. Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, OR	Far West

Organization		Region
Abbreviation	Full Title	
PSW	U.S. Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, CA	Far West
RADC	U.S. Air Force Rome Air Development Center, Griffiss AFB, NY	Northeast
RIBSS	U.S. Army Research Institute for the Behavioral and Social Sciences, Alexandria, VA	Mid-Atlantic
RM	U.S. Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO	Mid-Continent
RPL	Air Force Rocket Propulsion Laboratory, Edwards, CA	Far West
SE	U.S. Forest Service, Southeastern Forest Experiment Station, Asheville, NC	Southeast
SL	Sandia Laboratories, Albuquerque, NM	Mid-Continent
SO	U.S. Forest Service, Southern Forest Experiment Station, New Orleans, LA	Mid-Continent
TARADCOM	U.S. Army Tank-Automotive Research and Development Command, Warren, MI	Midwest
TSC	Transportation Systems Center, Cambridge, MA	Northeast
USGS	U.S. Geological Survey, Menlo Park, CA	Far West
WES	U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS	Southeast
WFC	Wallops Flight Center, Wallops, VA	Mid-Atlantic

MEMBER LABORATORY REPRESENTATIVES BY GEOGRAPHIC REGION

NORTHEAST REGION

AIR FORCE GEOPHYSICS LAB/CA
Dr. John N. Howard
Chief Scientist
Hanscom AFB, MA 01731
Tel: (617) 861-3161
A/V: 478-3161

ARMY ARMAMENT R&D COMMAND
Mr. Thomas C. Castorina
Dover, NJ 07801
Tele: (201) 328-2560
A/V: 880-2560

ARMY COLD REGIONS RES & ENG LAB
Dr. Andrew Assur
Chief Scientist
P. O. Box 282
Hanover, NH 03755
Tele: (603) 643-3200, X-237
A/V: 881-3700

ARMY ELECTRONICS R&D COMMAND
Dr. Walter S. McAfee
Scientific Advisor
Attn: DRDEL-SA
Fort Monmouth, NJ 07703
Tele: (201) 544-4131
A/V: 995-4131

ARMY MATERIALS AND MECHANICS RESEARCH CENTER
Mr. Raymond L. Farrow
Attn: Code DRXMR-PT
Watertown, MA 02172
Tele: (617) 923-3523
A/V: 684-3523

ARMY NATICK R&D COMMAND
Dr. S. David Bailey, Director
Food Sciences Lab
Natick, MA 01760
Tele: (617) 653-1000, X-2577
A/V: 955-2577

BROOKHAVEN NATIONAL LABORATORY
Mr. William Graves
Technology Utilization Officer
Building 460
Upton, NY 11973
Tele: (516) 345-3326

COAST GUARD R&D CENTER
Dr. Donald Birkimer
Technical Director
Avery Point
Groton, CT 06340
Tele: (203) 445-8501

ENVIRONMENTAL RESEARCH LABORATORY
Dr. Stanley H. Hergre
EPA
South Ferry Road
Narrangansett, RI 02880
Tele: (401) 789-1071

NATIONAL AVIATION FACILITIES EXPERIMENTAL CENTER
Mr. James Woodall
Technical Advisor to the Director
Building 12, ANA-1A
Atlantic City, NJ 08405
Tele: (609) 641-8200, X-3670

NAVAL AIR ENGINEERING CENTER
Mr. Michael Palamar
Code 9011
Lakehurst, NJ 08733
Tele: (201) 323-2648
A/V: 624-2648

NAVAL UNDERWATER SYSTEMS CENTER
Dr. James Atkinson
Code 0702, Bldg. 80T
New London, CT 06320
Tele: (203) 442-0771, X-2908
A/V: 636-2908

ROME AIR DEVELOPMENT CENTER
Mr. Fred DiMaggio
Code RADC-DOT
Griffiss AFB, NY 13441
Tele: (315) 330-2973
A/V: 587-2973

TRANSPORTATION SYSTEMS CENTER
Mr. R. V. Giangrande
DOT
Mail Code: 15
Kendall Square
Cambridge, MA 02142
Tele: (617) 494-2486

MID-ATLANTIC REGION

ARMY ENGINEER TOPOGRAPHIC LABORATORY
Dr. Kenneth R. Kothe
Fort Belvoir, VA 22060
Tele: (703) 664-5828
A/V: 354-5828

ARMY HUMAN ENGINEERING LAB
Mr. Donald Egner
Aberdeen, MD 21005
Tele: (301) 278-4567/4168
A/V: 283-4567/4168

ARMY MEDICAL R&D LABORATORIES
Mr. Lawrence Ware
Army Medical R&D Command
Fort Detrick-Bldg. 521
Frederick, MD 21701
Tele: (301) 663-7325
A/V: 343-7325

ARMY MOBILITY EQUIPMENT R&D COMMAND
Dr. Karl H. Steinbach
Attn: DRDME-ZK
Fort Belvoir, VA 22060
Tele: (703) 664-4970/3330
A/V: 354-4970/3330

ARMY NIGHT VISION & ELECTRO-OPTICS LABORATORIES
Mr. Richard V. Fulton
Attn: DELNV-D
Fort Belvoir, VA 22060
Tele: (703) 664-3923
A/V: 354-3923
Alt: Jeffrey Slusher

ARMY RESEARCH INSTITUTE FOR BEHAVORIAL AND SOCIAL SCIENCES
Dr. R. M Sasmor
5001 Eisenhower Blvd.
Alexandria, VA 22333
Tele: (202) 274-8636
A/V: 284-8636

MEDICAL DEVICES LABORATORY
Mr. Edward Meuller
FDA/BMD
8757 Georgia Avenue
Silver Spring, MD 20910
Tele: (202) 447-2468

DAVID W. TAYLOR NAVAL SHIP R&D CENTER
Dr. Basil Nakonechny
Code 1102.1
Bethesda, MD 20084
Tele: (202) 227-1681
A/V: 287-1681

CHEMICAL SYSTEMS LABORATORY
Dr. B. L. Harris
Aberdeen Proving Ground, MD 21010
Tele: (301) 671-2031
A/V: 584-4363
Alternate: Mr. William Barr
Tele: (301) 671-2031
A/V: 584-2031

FAIRBANK HIGHWAY RESEARCH STATION
Mr. Milton P. Criswell
Federal Highway Administration
HDV-20
2100 2nd Street, SW
Washington, D.C. 20590
Tele: (202) 426-9230

FEDERAL BUREAU OF INVESTIGATION
Dr. C. G. McWright
Department of Justice, FBI Lab
9th and Pennsylvania Avenue, NW
Washington, D.C. 20535
Tele: (202) 324-4420

FISH AND WILDLIFE NATIONAL TEAMS
Mr. Bernard K. Dennis
Office of Biological Sciences
U.S. Fish and Wildlife Service
Department of the Interior
Washington, D.C. 20240
Tele: (202) 634-4910

FOREST SERVICE
Northeastern Forest Experiment Station
Mr. Albert Faulger
6816 Market Street
Upper Darby, PA 19082
Tele: (215) 596-1614

FOREST SERVICE RESEARCH LABORATORIES
Mr. Harold G. Marx
U.S. Forest Service
Department of Agriculture
14th & Independence Avenue, RM 3112
Washington, D. C. 20250
Tele: (202) 447-7573

GODDARD SPACE FLIGHT CENTER
Mr. Donald S. Friedman
NASA, Code 702.1
Greenbelt, MD 20771
Tele: (301) 982-6242

HARRY DIAMOND LABORATORY
Mr. Clifford E. Lanham
Code DELHD-TT
2800 Powder Mill Road
Adelphi, MD 20783
Tele: (202) 394-2296
A/V: 290-2296

LANGLEY RESEARCH CENTER
Mr. John Samos
Mail Stop: 139A
NASA
Hampton, VA 23665
Tele: (804) 827-3281

NATIONAL BUREAU OF STANDARDS
Mr. James Wyckoff
A402, Administration Bldg.
Washington, D.C. 20234
Tele: (301) 921-3814

FISH AND WILDLIFE RESEARCH LABS
Mr. Duncan MacDonald
Division of Wildlife Research
Fish and Wildlife Service
U.S. Department of Interior
Washington, D.C. 20240
Tele: (202) 343-7557

NAVAL EXPLOSIVE ORDNANCE DISPOSAL CENTER
Mr. Lionel Dickinson
Technical Director
Indian Head, MD 20640
Tele: (301) 743-4439
A/V: 364-4439

NAVAL RESEARCH LABORATORY
Mr. Emanuel Brancato
Code 4104
Washington, D.C. 20375
Tele: (202) 767-3046
A/V: 297-3046

NAVAL SURFACE WEAPONS CENTER
Mr. Frederick Gleason, Jr.
Code CL
White Oak, Silver Spring, MD 20910
Tele: (301) 394-1505
A/V: 290-1505

WALLOPS FLIGHT CENTER
Mr. Gilmore H. Trafford
NASA/Wallops Flight Center
Wallops, VA 23337
Tele: (804) 824-3411, X-201
FTS: 928-5201

NAVAL AIR DEVELOPMENT CENTER
Mr. Jerome Bortman
Code 7012
Warminster, PA 19874
Tele: (215) 441-3100
A/V: 441-3100

SOUTHEAST REGION

AIR FORCE CIVIL ENGINEERING CENTER
Mr. Robert E. Brandon
Technical Director
Tyndall AFB, FL 32403
Tele: (904) 283-6200
A/V: 970-6200

ARMY ENGINEERS WATERWAYS EXPERIMENT STATION
Mr. A. Sherlock
WESTV
P. O. Box 631
Vicksburg, MS 39180
Tele: (601) 636-3111, X-3760
FTS: 542-3760

ARMY MISSILE R&D COMMAND
Mr. Victor Ruwe
DRDMI-EAA
Redstone Arsenal, AL 35809
Tele: (205) 876-3848/3995
A/V: 746-3848/3995

CIVIL & ENVIRONMENTAL ENGINEERING DEVELOPMENT OFFICE
COL Joseph S. Pizzuto
DET 1. (CEEDO)ADTC
Tyndall AFB, FL 32403
Tele: (904) 283-5287
A/V: 970-5287

GEORGE MARSHALL SPACE FLIGHT CENTER
Mr. Aubrey Smith
Mail Stop: AT01
NASA
Marshall Space Flight Center, AL 38512
Tele: (202) 453-2224

KENNEDY SPACE CENTER
Mr. Raymond J. Cerrato
Mail Stop: SA-RTP
NASA
Kennedy Space Center, FL 32899
Tele: (305) 867-2780

NATIONAL SPACE TECHNOLOGY LAB
Mr. Roy S. Estess
Mail Stop: MA21
Bay St. Louis, MS 39520
Tele: (601) 688-2125

NAVAL COSTAL SYSTEMS LABORATORY
Mr. John Vickers
Panama City, FL 32401
Tele: (904) 234-4420
A/V: 436-4420

NAVAL OCEANOGRAPHIC OFFICE
Mr. C. D. Griffith
Code 3030
NSTL Station
Bay St. Louis, MS 39522
Tele: (601) 688-4368
A/V: 485-4368

OAK RIDGE NATIONAL LABORATORY
Mr. Donald Jared
TU/C
P. O. Box X
Oak Ridge, TN 37830
Tele: (615) 483-8611, X-30121

MID-WEST REGION

AIR FORCE AERO PROPULSION LAB
Mr. Leo Harootyan
AFAPL-DOY
Wright-Patterson AFB, OH 45433
Tele: (513) 255-3428
A/V: 785-3428

AIR FORCE AVIONICS LABORATORY
Mr. James G. Johnson
Wright-Patterson AFB, OH 45433
Tele: (513) 255-5804
A/V: 785-5804

AIR FORCE MATERIALS LABORATORY
LT COL Gordon Hermann
Attn: AFML/NA
Wright-Patterson AFB, OH 45433
Tele: (513) 255-4528
A/V: 785-4528

AIR FORCE WRIGHT AERONAUTICAL LABORATORY
Mr. Rudy Bevins
Wright-Patterson AFB, OH 45433
Tele: (513) 255-2803
A/V: 785-2803

ARMY CONSTRUCTION ENGINEERING RESEARCH LABORATORY
Dr. Robert M. Dinnat
Associate Technical Director
P. O. Box 4005
Champaign, IL 61820
Tele: (217) 352-6511

ARMY TANK-AUTOMOTIVE R&D COMMAND
Mr. Ralph Trese
Attn: DRDTA-RGR
Warren, MI 48090
Tele: (313) 573-2319
Home: (703) 435-2465

FOREST SERVICE
North Central Forest Experiment Station
Folwell Avenue
St. Paul, MN 55108
Tele: (612) 784-0251

LEWIS RESEARCH CENTER
Mr. Paul Foster
Mail Stop: 7-3
NASA
21000 Brookpark Road
Cleveland, OH 44135
Tele: (216) 433-4000, X-422

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
Mr. A. F. Schaplowsky
Division of Technical Services
4676 Columbia Parkway
Cincinnati, OH 45215
Tele: (513) 864-8302
FTS: 684-8302

NAVAL WEAPONS SUPPORT CENTER
Mr. C. Dale Robinson
Director, Applied Science Department
Crane, IN 47522
Tele: (812) 854-1282/1358
A/V: 482-1282

MID-CONTINENT REGION

AIR FORCE AEROSPACE MEDICAL DIVISION
Mr. Thomas D. N. Douthit
AMD/RDX
Brooks AFB, TX 78235
Tele: (512) 536-3406
A/V: 240-3406

AIR FORCE HUMAN RESOURCES LABORATORY
COL Ralph S. Hoggatt
Chief Applications Office
Brooks AFB, TX 78235
Tele: (512) 536-3605
A/V: 240-3605
Alternate: LT COL Tom O'Connor

AIR FORCE WEAPONS LABORATORY
Dr. Arthur Guenther
Attn: AFWL/CA
Kirtland AFB, NM 87117
Tele: (505) 264-9856/8561
A/V: 964-9856/8561
Alternate: LT COL Lothar O. Hoeft

DUGWAY PROVING GROUNDS
Mr. Mortimer Rothenburg
Scientific Director
Attn: STEDP-SC
Dugway, UT 84022
Tele: (801) 522-3314
A/V: 789-3314

FOREST SERVICE
Intermountain Experiment Station
507 - 25th Street
Ogden, UT 84401
Tele: (801) 586-6286

INSTITUTE FOR TELECOMMUNICATION SCIENCES
Dr. Bernard Wieder
National Telecommunication and Information Administration
Boulder, CO 80303
Tele: (303) 499-1000, X-3484
FTS: 323-3484

LOS ALAMOS SCIENTIFIC LABORATORY
Dr. Eugene Stark
Technology Liaison Office
Los Alamos, NM 87545
Tele: (505) 667-4548
FTS: 843-4548

LYNDON B. JOHNSON SPACE CENTER
Mr. John T. Wheeler
Mail Stop: AT3
NASA
Houston, TX 77058
Tele: (713) 483-3809

SANDIA LABORATORIES - 9636
TU Program
Mr. G. Corry McDonald
Albuquerque, NM 87115
Tele: (505) 264-1947

FAR WEST REGION

AIR FORCE ROCKET PROPULSION LABORATORY
Mr. Geral Sayles
Attn: AFRPL/XP
Edwards, CA 95323
Tele: (714) 553-2342
A/V: 350-1110, X-32342

AMES RESEARCH CENTER
Mr. Charles C. Kubokawa
Mail Stop: 240-2
NASA
Moffett Field, CA 94035
Tele: (415) 965-5554

BOISE INTERAGENCY FIRE CENTER
Mr. John Warren
3905 Vista Avenue
Boise, ID 83705
Tele: (208) 384-1439
FTS: 554-1439

CIVIL ENGINEERING LABORATROY
Mr. Eugene H. Early
L03C
Port Hueneme, CA 93043
Tele: (805) 982-4070
A/V: 360-4070

FOREST FIRE LABORATORY
Mr. Richard Chase
P.O. Box 5007
Riverside, CA 92507
Tele: (714) 787-1579

HUGH L. DRYDEN FLIGHT RESEARCH CENTER
Mr. John C. Drane
P. O. Box 273
NASA
Edwards, CA 93523
Tele: (805) 258-3311, X-466

JET PROPULSION LABORATORY
Mr. John C. Drane
NASA
4800 Oak Grove Drive
Pasadena, CA 91103
Tele: (213) 354-6420

LAWRENCE BERKELEY LABORATORY
Mr. Robert J. Morris
University of California
Building 90, Room 1106
Berkeley, CA 94720
Tele: (415) 843-2740, X-6502

LAWRENCE LIVERMORE LABORATORY
Mr. R. Carroll Maninger
University of California
P. O. Box 808-L790
Livermore, CA 94550
Tele: (415) 422-6902

NAVAL BIOSCIENCES LABORATORY
LT William M. Coleman III
Naval Supply Center
Oakland, CA 95624
Tele: (415) 832-6343
A/V: 836-6343

NAVAL HEALTH RESEARCH CENTER
Dr. Milton Richlin
Code 8090
San Diego, CA 92152
Tele: (714) 225-7393

NAVAL OCEAN SYSTEMS CENTER
Mr. Donald H. Courter
Code 013(B)
San Diego, CA 92152
Tele: (714) 225-7455
A/V: 933-7455

NAVAL POSTGRADUATE SCHOOL
Dr. J. W. Creighton
Code 54CF
Monterey, CA 93940
Tele: (408) 646-2048
A/V: 878-2048

NAVAL WEAPONS CENTER
Mr. George F. Linsteadt
Code 3203
China Lake, CA 93555
Tele: (714) 939-7325/7359
A/V: 245-7325/7359

NAVY PERSONNEL R&D CENTER
Mr. Allan A. Sjoholm
Code 201
San Diego, CA 92151
Tele: (714) 236-6093
A/V: 933-2712
Alternate: Dr. Frank Sands
Code 201s
Tele: (714) 225-7424
A/V: 933-7424

U.S. GEOLOGICAL SURVEY
Mr. George E. Robinson
345 Middlefield Road
Menlo Park, CA 94025
Tele: (415) 323-8111, X-2711

MEMBER LABORATORIES
BY GEOGRAPHIC REGION

NORTHEAST REGION

Department of Agriculture

Forest Service

Forest Environment Project	Pennington, NJ
Forest Environment Research Unit	Amherst, MA
Forest Insect and Disease Laboratory	Hamden, CT
Forest Science Laboratory	Durham, NH
Forest Science Laboratory	Syracuse, NY
Sugar Maple Laboratory	Burlington, VT
Timber Research Laboratory	Orono, ME

Department of Defense

Air Force

Air Force Geophysics Laboratory	Hanscom, MA

Army

Army Research Institute of Environmental Medicine	Natick, MA
Army Armament R&D Command	Dover, NJ
Army Cold Regions Research and Engineering Laboratory	Hanover, NH
Army Electronics R&D Command	Fort Monmouth, NJ
Army Materials and Mechanics Research Center	Watertown, MA
Army Natick R&D Command	Natick, MA

Navy

Naval Air Engineering Center	Lakehurst, NJ
Naval Underwater Systems Center	New London, CT
Naval Air Development Center	Griffiss, NY

Department of Energy

Brookhaven National Laboratory	Upton, NY

Environmental Protection Agency

Environmental Research Laboratory	Narragansett, RI

Department of Interior

Fish and Wildlife Service

Atlantic Salmon Investigations	Orono, ME
Tunison Laboratory of Fish Nutrition	Cortland, NY

Department of Transportation

Coast Guard R&D Center	Groton, CT
National Aviation Facilities Experimental Center	Atlantic City, NJ
Transportation Systems Center	Cambridge, MA

MID-ATLANTIC REGION

Department of Agriculture

Forest Service

Forest Products and Marketing Laboratory	Princetown, WV
Forestry Sciences Laboratory	Blacksburg, VA
Forestry Sciences Laboratory	Morgantown, WV
Forestry Sciences Laboratory	Warren, PA
Northeastern Forest and Range Experiment Station	Upper Darby, PA
Physiology Laboratory	Beltsville, MD
Timber and Watershed Laboratory	Parsons, WV

Department of Commerce

National Bureau of Standards	Washington, D.C.

Department of Defense

Army

Army Engineer Topographic Laboratory	Fort Belvoir, VA
Army Human Engineering Laboratory	Aberdeen, MD
Army Institute of Dental Research	Washington, D.C.
Army Medical Bioengineering Research	Frederick, MD
Army Medical Research Institute of Infectious Diseases	Frederick, MD
Army Mobility Equipment R&D Command	Fort Belvoir, VA
Army Night Vision & Electro-Optics Laboratories	Fort Belvoir, VA
Army Research Institute for Behavorial and Social Sciences	Alexandria, VA
Chemical Systems Laboratory	Aberdeen, MD
Harry Diamond Laboratory	Adelphi, MD
Walter Reed Army Institute Research	Washington, D.C.

Navy

David W. Taylor Naval Ship R&D Center	Bethesda, MD
Naval Air Development Center	Warminster, PA
Naval Explosive Ordance Disposal Center	Indian Head, MD
Naval Oceanographic Office	Washington, D.C.
Naval Research Laboratory	Washington, D.C.
Naval Surface Weapons Center	White Oak, MD

Health, Education and Welfare

Medical Devices Laboratory	Silver Spring, MD

Department of Interior

Fish and Wildlife Service

Eastern Fish Disease Laboratory	Kearneysville, WV
Migratory Bird and Habitat Research Laboratory	Laurel, MD
National Fish and Wildlife Laboratory	Washington, D.C.
Patuxent Wildlife Research Center	Laurel, MD

Department of Justice

Federal Bureau of Investigation	Washington, D.C.

National Aeronautics and Space Administration (NASA)

Goddard Space Flight Center	Greenbelt, MD
Langley Research Center	Hampton, VA
Wallops Flight Center	Wallops, VA

Department of Transportation

Fairbank Highway Research Station	Washington, D.C.

SOUTHEAST REGION

Department of Agriculture

Forest Service

Coweeta Hydrologic Laboratory	Franklin, NC
Forest Fire Laboratory	Macon, GA
Forest Hydrology Laboratory	Oxford, MS
Forest Recreation Unit	Tuskegee, AL
Forest Resources Laboratory	Lehigh Acres, FL
Forest Tree Seed Laboratory	State College, MS
Forestry Recreation Unit	Clemson, SC
Forestry Sciences Laboratory	Athens, GA
Forestry Sciences Laboratory	Auburn, AL
Forestry Sciences Laboratory	Berea, KY
Forestry Sciences Laboratory	Charleston, SC
Forestry Sciences Laboratory	Marianna, FL
Forestry Sciences Laboratory	Research Triangle, NC
Institute of Forest Genetics and Forest Insect and Disease Laboratory	Gulfport, MS
Institute of Tropical Forestry	Pio Piedras, Puerto Rico
Naval Stores and Timber Product Laboratory	Olustee, FL
Silviculture Laboratory	Sewanee, TN
Southeastern Forest Experiment Station	Asheville, NC
Southern Hardwoods Laboratory	Stoneville, MS

Department of Defense

Air Force

Air Force Civil Engineering Center	Tyndall AFB, FL
Civil and Environmental Engineering Development Office	Tyndall AFB, FL

Army

Army Aeromedical Research Laboratory	Fort Rucker, AL
Army Engineers Waterways Experiment Station	Vicksburg, MS
Army Missile R&D Command	Redstone Arsenal, AL

Navy

Naval Costal Systems Laboratory	Panama City, FL

Department of Energy

Oak Ridge National Laboratory	Oak Ridge, TN

Department of Interior

Fish and Wildlife Service

Southeastern Fish Cultural Laboratory	Marion, AL
National Costal Ecosystems Team	Bay St. Louis, MS

National Aeronautics and Space Administration (NASA)

George Marshall Space Flight Center	Marshall SFC, AL
Kennedy Space Center	Kennedy SC, FL
National Space Technology Lab	Bay St. Louis, MS

MID-WEST REGION

Department of Agriculture

Forest Service

Forest Engineering Laboratory	Houghton, MI
Forest Insect and Disease Laboratory	Delaware, OH
Forest Products Laboratory	Madison, WI
Forestry Sciences Laboratory	Carbondale, IL
Institute of Forest Genetics	Rhinelander, WI
North Central Forest Experiment Station	St. Paul, MN
Northern Conifers Laboratory	Grand Rapids, MN
Northern Hardwoods Laboratory	LaCrosse, WI

Department of Defense

Air Force

Air Force Aero Propulsion Laboratory	Wright-Patterson, OH
Air Force Avionics Laboratory	Wright-Patterson, OH
Air Force Materials Laboratory	Wright-Patterson, OH
Air Force Wright Aeronautical Laboratory	Wright-Patterson, OH

Army

Army Construction Engineering Research Laboratory	Champaign, IL
Army Tank-Automotive R&D Command	Warren, MI

Navy

Naval Weapons Support Center	Crane, IN

Department of Interior

Fish and Wildlife Service

Fish Control Laboratory	LaCrosse, WI
Great Lakes Fishery Laboratory	Ann Arbor, MI
National Fish and Wildlife Health Laboratory	Madison, WI
National Power Plant Team	Ann Arbor, MI

Health, Education and Welfare

National Institute for Occupational Safety and Health	Cincinnatti, OH

National Aeronautics and Space Administration (NASA)

Lewis Research Center	Cleveland, OH

MID-CONTINENT REGION

Department of Agriculture

Forest Service

Alexandria Forestry Center	Alexandria, LA
Forest Range and Watershed Laboratory	Laramie, WY
Forestry Research Laboratory	Rapid City, SD
Forestry Science Laboratory	Albuquerque, NM
Forestry Science Laboratory	Bozeman, MT
Forestry Sciences Laboratory	Fayetteville, AR
Forestry Sciences Laboratory	Logan, UT
Forestry Sciences Laboratory	Missoula, MT
Intermountain Forest and Range Experiment Station	Ogden, UT
Northern Forest Fire Laboratory	Missoula, MT
Rocky Mountain, Forest and Range Experiment Station	Fort Collins, CO
Shelterbelt Laboratory	Bottineau, ND
Shelterbelt Laboratory	Lincoln, NE
Shrub Improvement Laboratory	Provo, UT
Southern Forest Experiment Station	New Orleans, LA
Wildlife Habitat and Silviculture Laboratory	Nacogdoches, TX

Department of Defense

Air Force

Air Force Aerospace Medical Division	Brooks AFB, TX
Air Force Human Resources Laboratory	Brooks AFB, TX
Air Force Weapons Laboratory	Kirtland AFB, NM

Army

Army Institute of Surgical Research	Fort Sam Houston, TX
Dugway Proving Grounds	Dugway, UT

Department of Energy

Los Alamos Scientific Laboratory	Los Alamos, NM
Sandia Laboratories	Albuquerque, NM

Department of Interior

Fish and Wildlife Service

Fish Farming Experimental Station	Stuttgart, AR
Editorial Office	Fort Collins, CO
Denver Wildlife Research Center	Denver, CO
Fish Genetics Laboratory	Beulah, WY
Fish-Pesticide Research Laboratory	Columbia, MO
National Energy & Land Use Team	Fort Collins, CO
National Reservoir Research Program	Fayetteville, AR
National Stream Alterations Team	Columbia, MO
Northern Prairie Wildlife Research Center	Jamestown, ND

Department of Commerce

National Telecommunication and Information Administration

Institute for Telecommunication Sciences	Boulder, CO

National Aeronautics and Space Administration (NASA)

Lyndon B. Johnson Space Center	Houston, TX

FAR WEST REGION

Department of Agriculture

Forest Service

Boise Interagency Fire Center	Boise, ID
California Rangeland Project	Fresno, CA
Forest Engineering Laboratory	Seattle, WA
Forest Fire Laboratory	Riverside, CA
Forest Hydrology Laboratory	Tempe, AZ
Forest Hydrology Laboratory	Wenatchee, WA
Forestry Sciences Laboratory	Boise, ID
Forestry Sciences Laboratory	Corvallis, OR
Forestry Sciences Laboratory	Flagstaff, AZ
Forestry Sciences Laboratory	Juneau, AK
Forestry Sciences Laboratory	Moscow, ID
Forestry Sciences Laboratory	Olympia, WA
Institute of Northern Forestry	Fairbanks, AK
Institute of Pacific Island Forestry	Honolulu, HI
Pacific Northwest Forest and Range Experiment Station	Portland, OR
Pacific Southwest Forest and Range Experiment Station	Berkeley, CA
Range and Wildlife Habitat Laboratory	LaGrande, OR
Range Research Laboratory	Tucson, AZ
Redwoods Laboratory	Arcata, CA
Silviculture Laboratory	Bend, OR
Silviculture Laboratory	Redding, CA

Department of Defense

Air Force

Air Force Rocket Propulsion Laboratory	Edwards, CA

Army

Letterman Army Institute of Research	San Francisco, CA

Department of Defense (Contd)

Navy

Civil Engineering Laboratory	Port Hueneme, CA
Naval Biosciences Laboratory	Oakland, CA
Naval Health Research Center	San Diego, CA
Naval Ocean Systems Center	San Diego, CA
Naval Postgraduate School	Monterey, CA
Naval Weapons Center	China Lake, CA
Navy Personnel R&D Center	San Diego, CA

Department of Energy

Lawrence Berkeley Laboratory	Berkeley, CA
Lawrence Livermore Laboratory	Livermore, CA

Department of Interior

Fish and Wildlife Service

Pyramid Lake Project	Reno, NV
Western Fish Disease Laboratory	Seattle, WA

United States Geological Survey

United States Geological Survey	Menlo Park, CA

National Aeronautics and Space Administration (NASA)

Ames Research Center	Moffett Field, CA
Hugh L. Dryden Flight Research Center	Edwards, CA
Jet Propulsion Laboratory	Pasadena, CA

CONTAC LABORATORIES

ATMOSPHERIC SCIENCES TECHNOLOGY

Mr. Gilmore H. Trafford
NASA/Wallops Flight Center
Wallops, VA 23337
(804) 824-3411 ext. 2201

BIOMEDICAL TECHNOLOGY

Mr. Clifford Laham
Code DELHD-TT
Harry Diamond Laboratories
2800 Powder Mill Road
Adelphi, MD 20783
(202) 394-2296

BUSINESS ADMINISTRATION PRACTICES

Dr. Robert M. Dinnat
Army Construction Engineering Research Laboratory
P.O. Box 4005
Champaign, IL 61820
(217) 352-6511

COMMUNICATIONS

Mr. Donald Courter
Code 13B
Naval Ocean Systems Center
San Diego, CA 92152
(714) 225-7455

COMPUTER TECHNOLOGY

Mr. Paul Foster
Mail Stop 7-3
NASA/Lewis Research Center
21000 Brookpark Road
Cleveland, OH 44135
(216) 433-4000 ext. 6832

CONSTRUCTION TECHNOLOGY

Dr. Robert M. Dinnat
Army Construction Engineering Research Laboratory
P.O. Box 4005
Champaign, IL 61820
(217) 352-6511

CONSTRUCTION TECHNOLOGY (COLD REGIONS)

Dr. Andrew Assur
Army Cold Regions Research and Engineering Laboratory
P.O. Box 282
Hanover, NH 03755
(603) 643-3200 ext. 237

DETECTION

Mr. Richard Fulton
Attn: AMSEL-NV-D
Army Night Vision and Electro-Optics Laboratory
Fort Belvoir, VA 22060
(703) 664-3923

ELECTROTECHNOLOGY

Mr. James G. Johnson
Air Force Avionics Laboratory
Wright-Patterson AFB, OH 45433
(513) 255-5804

ENERGY (ALTERNATIVES)

Dr. Eugene Stark
Technology Liaison Office
Los Alamos Scientific Laboratory
Los Alamos, NM 87545
(505) 667-4548

ENERGY (SOLAR)

Mr. R. Carroll Maninger
University of California
Lawrence Livermore Laboratory
P.O. Box 808 L790
Livermore, CA 94550
(415) 422-6902

ENERGY (GEOTHERMAL)

Mr. Robert J. Morris
University of California
Lawrence Berkeley Laboratory
Building 903, Room 309
Berkeley, CA 94720
(415) 843-2740 ext. 6502

ENERGY (NUCLEAR)

Dr. Eugene Stark
Technology Liaison Office
Los Alamos Scientific Laboratory
(505) 667-4548

FIRE

Mr. George Linsteadt
Code 3203
Naval Weapons Center
China Lake, California 93555
(714) 939-7325/7359

FOOD SCIENCES

Dr. S. David Bailey
Food Sciences Laboratory
Army Natick Research and Development Command
Natick, MA 01760
(617) 653-1000 ext. 2577

HAZARDOUS MATERIALS

Mr. C. Maxon Greenland
Chemical Systems Laboratory
Aberdeen Proving Ground, MD 21010
(301) 671-2155

HUMAN RESOURCES R&D

Mr. Allan A. Sjoholm
Code 201
Navy Personnel R&D Center
San Diego, CA 92152
(714) 225-2712

INVESTIGATIVE PROCEDURES

Mr. C. G. McWright
Federal Bureau of Investigation Laboratory
DOJ
9th and Penn Ave., NW
Washington, D.C. 20535
(202) 324-4420

LAW ENFORCEMENT

Mr. Gerald Miller
Office of S&T
240 Cottage Street, SE
Salem, OR 97310
(503) 378-4201/5460

LIBRARY AND INFORMATION SCIENCES

Mr. Donald Courter
Code 013B
Naval Ocean Systems Center
San Diego, CA 92152
(714) 225-6251

NAVIGATION AND GUIDANCE (AIR)

Mr. James G. Johnson
Air Force Avionics Laboratory
Wright-Patterson AFB, OH 45433
(513) 255-5804

NAVIGATION AND GUIDANCE (WATER)

Dr. Donald Birkimer
Coast Guard R&D Center
Avery Point
Groton, CT 06340
(203) 445-8501

NUCLEAR TECHNOLOGY

Dr. Eugene Stark
Technology Liaison Office
Los Alamos Scientific Laboratory
Los Alamos, NM 87545
(505) 667-4548

OCEAN TECHNOLOGY

Mr. Eugene H. Early
Code L03C
Civil Engineering Laboratory
Port Hueneme, CA 93043
(805) 982-4070

ORDNANCE

Dr. Lionel Dickinson
Naval Explosive Ordnance Disposal Center
Indian Head, MD 20640
(301) 743-4439

PHOTOGRAPHY

Dr. Kenneth R. Kothe
Army Engineer Topographic Laboratory
Fort Belvoir, VA 22060
(703) 664-3717

POLLUTION (MARINE)

Dr. Donald Birkimer
Coast Guard R&D Center
Avery Point
Groton, CT 06340
(203) 445-8501

POLLUTION (WATER AND AIR)

Dr. Allan Hilsmeir
Chemical Systems Laboratory
Aberdeen Proving Ground, MD 21010
(301) 671-3133

REMOTE SENSING

Dr. Charles C. Kubokawa
Mail Stop 240-2
NASA/Ames Research Center
Moffet Field, CA 94035
(415) 965-5554

STANDARDS SCIENCE

Mr. James Wyckoff
National Bureau of Standards
A402, Administration Building
Washington, D.C. 20234
(301) 941-3814

TELECOMMUNICATION

Dr. Bernard Wieder
Institute for Telecommunication Sciences
U.S. Department of Commerce
Boulder, CO 80302
(303) 499-1000 ext. 3484

TRANSPORTATION

Mr. R. V. Giangrande
Transportation Systems Center
Mail Code: 15
Kendall Square
Cambridge, MA 02142

URBAN AND REGIONAL TECHNOLOGY

Dr. James Atkinson
Code 0702, Building 80T
Naval Underwater Systems Center
New London, CT 06320
(203) 442-0771 ext. 2908

FEDERAL LABORATORY
SCIENTIFIC AND TECHNICAL ACTIVITIES

APPLICATION AREA	LABORATORY
ADMINISTRATION	
Computer Application	HDL, NUSC, WES, ARRADCOM, NWC
Inventory Control	CERL, NWC, LLL, NUSC, LBL, KSC, LaRC
Management Practice	AMMRC, AFAPL, CERL, NWC, NPRDC, NUSC, NWSC, ARRADCOM, HRL
Management Information	NOSC, NWSC, NRDC, AMMRC, NCSL, AFAPL, CERL, NWC, NUSC, NADC, WES, ARRADCOM, KSC, NPRDC
Personnel Management, Labor Relations and Manpower Studies	LBL, NWC, LLL, RIBSS, NUSC, HRL, NADC, NPRDC, NWSC
Personnel Selection and Classification	HRL
Research Program Administration and Technology Transfer	NOSC, NWSC, AMMRC, FHRS, MERADCOM, CEC, NE, INT, NC, PNW, FSR, RIBSS, NUSC, HDL, NSWC, HRL, NADC, NCSL, AFAPL, CERL, LASL, NWC, SO, RM, SE, CSL, WES, LeRC, AMD, WFC, ARRADCOM, KSC, NPRDC, LaRC, CEEDO, LLL, PSW
General	NUSC, ARRADCOM
AERONAUTICS AND AERODYNAMICS	
Aeroballistics	SL, NADC, CSL, NWC
Aerodynamics	NSRDC, AFAPL, AFWAL, SL, NWC, NSWC, NADC, LeRC, LaRC, AFWL
Aeronautics	AFWAL, NWC, NADC, LaRC
Aircraft	AFWAL, NAFEC, BIFC, NADC, AMD, WFC, NWC, LaRC

APPLICATION AREA	LABORATORY
Airports	NAFEC, WES, AMD, WFC
Parachutes and Decelerators	NRDC, AFWAL, SL, NSWC, NADC, NWSC, NWC, LaRC
Avionics	AFWAL, AFAL, NAFEC, BIFC, NADC, AMD, KSC, NWC, LaRC
Test Facilities and Equipment	FHRS, NSRDC, AFWAL, SL, NWC, NAFEC, NSWC, NADC, WES, LeRC, AMD, KSC, LaRC
General	SL, WES, WFC, NWC, LaRC, NAFEC
AGRICULTURE AND FOOD	
Agricultural Chemistry	LASL, KSC, NWC
Agricultural Economics	NWC
Agricultural Equipment, Facilities, and Operations	LASL
Agricultural Resource Surveys	KSC
Agronomy, Horticulture, and Plant Pathology	KSC
Animal Husbandry and Veterinary Medicine	LASL, NBL, NOSC
Fisheries and Aquaculture	NOSC, NUSC, ORNL
Food Technology	NRDC
General	NWC
ASTRONOMY AND ASTROPHYSICS	
Astrogeology	LASL, LLL, USGS
Astronomy and Celestial Mechanics	ETL, LLL
Astrophysics	LASL, LLL, NADC, KSC
Cosmic Ray Research	LASL, LLL, LBL
General	LASL

APPLICATION AREA	LABORATORY
ATMOSPHERIC SCIENCES	
Aeronomy	LLL, LBL, AFWL, KSC, LaRC
Dynamic Meteorology	SL, LLL, BIFC, KSC, LaRC
Meteorological Data Collection, Analysis and Weather Forecasting	LASL, LLL, FFL, BIFC, NADC, WES, WFC, KSC, LaRC, AFGL, NWC
Meteorological Instruments and Instrument Platforms	LASL, SL, NWC, LLL, FFL, BIFC, KSC, LaRC, ADPG
Monitoring	HDL, AFGL, USGS, CSL, NWC
Physical Meteorology	HDL, LASL, SL, LLL, NSWC, AFGL, KSC
Weather Modification	NWC, LLL, NWSC, LSC
General	SL, KSC, NWC, ADPG
BEHAVIOR AND SOCIETY	
Education, Law and Humanities	RIBSS
International Relations	
Job Training and Career Development	AMMRC, LASL, NPRDC, LLL, RIBSS, HRL, NADC, NHRC, NWC, LaRC
Psychology	NWSC, CERL, NPRDC, RIBSS, NUSC, HRL, NADC
Social Concerns	RIBSS, HRL, NIOSH, NPRDC
General	HRL
BIOMEDICAL TECHNOLOGY AND HUMAN FACTORS ENGINEERING	
Biomedical Instrumentation and Bioengineering	HDL, MDL, NCSL, LASL, NOSC, LLL, ORNL, NUSC, LBL, AMD, LeRC, KSC, NWC LaRC

APPLICATION AREA	LABORATORY
Bionics and Artificial Intelligence	KSC, NOSC
Human Factors Engineering	HEL, LASL, SL, NOSC, NADC, NUSC, KSC, NPRDC, LaRC, ORNL
Life Support Systems	NOSC, HDL, NCSL, LASL, NSWC, NADC CSL, KSC, NWC
Prosthetics and Mechanical Organs	MDL, LASL, NSWC, AMRDC, LeRC, HDL, KSC
Tissue Preservation and Storage	
General	LASL, SL, ORNL, HDL, KSC
BUILDING INDUSTRY TECHNOLOGY	
Architectural Design and Environmental Engineering	NWSC, CERL, LASL, SL, LLL, NBL, LBL, WES, KSC, NWC, LaRC
Building Equipment, Furnishings and Maintenance	CERL, SL, LaRC
Building Standards and Codes	NWSC, CEC, CERL, SL, WES, KSC
Construction Management and Techniques	NWSC, CEC, CERL, WES, KSC, LaRC
Construction Materials, Components and Equipment	CEL, KSC, CERL, MERADCOM, NSRDC
Structural Analyses	NWSC, NSRDC, MERADCOM, CEC, CEL, WES, KSC, NWC, LaRC
General	SL, WES
BUSINESS AND ECONOMICS	
Banking and Finance	
Consumer Affairs	

APPLICATION AREA	LABORATORY
Domestic Commerce, Marketing and Economics	AMMRC, LLL, LBL
Foreign Industry Development and Economics	
International Commerce, Marketing and Economics	
Minority Enterprises	LeRC
General	NWC

CHEMISTRY

APPLICATION AREA	LABORATORY
Analytical Chemistry	NOSC, NRDC, AMMRC, MERADCOM, CSL, AFML, AFAPL, LASL, SL, ADPG, NWSC, NWC, LLL, NBL, ERL, NSWC, FBI, NADC, NRL, CEEDO, NIOSH, WES, LeRC, KSC, ORNL
Basic and Synthetic Chemistry	LASL, LLL, NSWC, CSL, LBL, NWSC, LeRC, NWC, LaRC, ORNL
Industrial Chemistry and Chemical Process Engineering	LASL, LLL, NSWC, CSL, LBL, NWSC, WES, LeRC, NWC, AFML, ORNL
Photo and Radiation Chemistry	NOSC, NWSC, LASL, SL, LLL, NSWC, NADC, LBL, ETL, LeRC, NWC, LaRC, ORNL
Physical and Theoretical Chemistry	NWSC, MERADCOM, LASL, SL, NWC, LLL, HDL, NSWC, AFGL, LBL, CSL, WES, LeRC KSC, LaRC, NRL, ORNL
Polymer Chemistry	NOSC, BNL, MERADCOM, SL, NWC, LLL, HDL, NSWC, NRL, NADC, WES, LeRC, KSC, LaRC, AFML
General	NADC, CSL, ARRADCOM, NWC

CIVIL ENGINEERING

APPLICATION AREA	LABORATORY
Civil Engineering	MERADCOM, CEC, CERL, CEL, NWSC, CEEDO, WES

APPLICATION AREA	LABORATORY
Construction Equipment, Materials and Supplies	MERADCOM, CEC, CERL, CEL, NWSC, CEEDO, WES, NWC
Earthquake Design.	LLL, WES, CEL
Flood Control.	WES
Highway Engineering.	FHRS, CERL, NWSC, WES
Hydraulic Engineering.	WES
Soil and Rock Mechanics.	NWSC, CEC, LASL, SL, CEL, LLL, AFWL, CEEDO, WES, KSC, NWC
General.	ETL, LASL
COMMUNICATION	
Common Carrier and Satellite . .	NOSC, KSC, NUSC, AFGL, NADC, ITS, LeRC
Communication and Information Theory	LASL, SL, LLL, RIBSS, NUSC, NADC, ITS, AMD, KSC, NWC, NOSC, ORNL
Graphics	WES, SL, NWC, NUSC, NADC, ITS, KSC, ORNL
Policies, Regulations and Studies.	ITS
Radio and Television Equipment.	NWSC, HDL, LASL, NOSC, NWC, LLL, KSC, BIFC, ITS
Sociopolitical	ITS
Verbal	NUSC, NADC, ITS
General.	RADC, NADC, ITS,TSC
COMPUTERS, CONTROL AND INFORMATION THEORY	
Computer Hardware.	NOSC, LBL, AFWL, NWSC, BNL, ETL, CERL, LASL, LLL, NUSC, NSWC, NADC, WES ARRADCOM, KSC, NWC, LaRC, ORNL

APPLICATION AREA	LABORATORY
Computer Software.	NOSC, AMMRC, HDL, ETL, NSRDC, MERADOCM, NPRDC, CERL, LASL, SL, NWC, LLL, NAEC, NUSC, NSWC, HRL, NADC, LBL, NWSC, BNL, CSL, WES, ARRADCOM, KSC, LaRC, AFWL, ORNL
Control Systems and Control Theory	NOSC, AFWL, NWSC, LASL, NWC, LLL, HDL, NSWC, NADC, LBL, LeRC, ARRADCOM, KSC, LaRC, ORNL
Information Processing Standards.	CERL, LLL, RIBSS, NAEC, NWSC, WES, LeRC, KSC, NWC, LaRC, ORNL
Information Theory	NOSC, LLL, NAEC, NWSC, KSC, LaRC, ORNL
Pattern Recognition and Image Processing	NOSC, BNL, NVEOL, ETL, LASL, LLL, SL, NAEC, NUSC, NSWC, CSL, LBL, WES, HDL, KSC, NWC, LaRC, ORNL
General.	NADC, HDL
DETECTION AND COUNTERMEASURES	
Acoustic Detection	HDL, NSRDC, MERADCOM, NCSL, NSWC, AFAL, CERL, LASL, NOSC, NWC, NUSC, NADC, WES, KSC, LaRC
Electromagnetic and Acoustic Countermeasures.	NOSC, NWSC, HDL, NCSL, AFAL, RADC, NUSC, NADC, CSL, WES, KSC, NWC
Infrared and Ultraviolet Detection.	AFWL, NVEDL, MERADCOM, AFAL, SL, NWC, LLL, NUSC, HDL, NSWC, BIFC, NADC, WES, KSC, LaRC
Magnetic Detection	HDL, MERADCOM, NCSL, AFAL, NSWC, NADC, WES, KSC, NWC
Nuclear Explosion Detection. . .	LASL, SL, AFWL, NOSC
Optical Detection.	NWSC, NVEDL, AFAL, NOSC, NWC, NUSC, NSWC, NADC, ETL, WES, AMD, KSC

APPLICATION AREA	LABORATORY
Personal Detection	NOSC, NVEOL, MERADCOM, NCSL, AFAL, SL, RADC, NADC, ETL, WES, HDL, NWC
Radio Frequency Detection	NWSC, MERADCOM, AFAL, NWC, LLL, NUSC, NADC, KSC
Seismic Detection	MERADCOM, NCSL, LASL, SL, LLL, NSWC, USGS, WES, KSC
General	HDL, RADC, BIFC, NADC, WES
ELECTROTECHNOLOGY	
Antennas	NWSC, MERADCOM, AFAL, LASL, SL, NOSC, NWC, LLL, RADC, NUSC, HDL, NSWC, NADC, LeRC, WFC, KSC, LaRC
Circuits	NOSC, NWSC, MERADCOM, AFAL, AFAPL, LASL, AFWL, NWC, LLL, RADC, NUSC, HDL, NSWC, NADC, LeRC, KSC, LaRC, ORNL
Electromechanical Devices	NOSC, NWSC, MERADCOM, NCSL, AFAL, AFAPL, LASL, LLL, NSWC, NADC, LeRC, WFC, KSC, NWC, LaRC, ORNL
Electron Tubes	AFAL, LASL, LLL, NWSC, LeRC, KSC, NWC
Optoelectronic Devices and Systems	AFWL, LBL, NWSC, NVEDL, ETL, LASL, NOSC, NWC, LLL, NUSC, HDL, NSWC, NADC, KSC, LaRC, ORNL
Power and Signal Transmission Devices	NOSC, NWSC, MERADCOM, AFAPL, LASL, CEL, LLL, RADC, HDL, LeRC, KSC, NWC, LaRC, NSWC, ORNL
Resistive, Capacitive and Inductive Components	NWSC, AFAPL, LASL, LLL, HDL, NSWC, LBL, LeRC, KSC
Semiconductor Devices	NOSC, NWSC, NVEDL, MERADCOM, AFAPL, LASL, LLL, HDL, NSWC, NRL, LeRC, KSC, NWC, LaRC, ORNL
Telemetry	WFC

APPLICATION AREA	LABORATORY
General	NWSC, MERADCOM, TARADCOM, LASL, NOSC, RADC, HDL, NRL, NWC, ORNL
ENERGY	
Batteries and Components	HDL, MERADCOM, NWC, LLL, NUSC, NSWC, NADC
Electric Power Production	NWSC, MERADCOM, LLL, NADC, NWC, ORNL
Electric Power Transmission	NWSC, NSRDC, MERADCOM, CERL, LASL, BNL, KSC, ORNL
Energy Sources	LeRC, AFAPL
Energy Transmission	LeRC
Energy Use, Supply and Demand	NWSC, LBL, HDL, AFAPL, CERL, LASL, NWC, LLL, FSR, ORNL, NSWC, NADC, USGS, TSC, KSC
Engine Studies (Energy Related)	NWSC, AMMRC, NSRDC, MERADCOM, LLL, AFAPL, LBL, TARADCOM, LASL, NUSC, NADC, LeRC, KSC, ORNL
Environmental Studies	LBL, CERL, LASL, NWC, LLL, NUSC, CEEDO, WES, ORNL
Fuel Conversion Processes	NOSC, NWSC, LBL, MERADCOM, CERL, LASL, LLL, ORNL, CSL, LeRC, AMD, NWC, AFAPL
Fuels	BNL, NWSC, NSRDC, MERADCOM, AFAPL, CEEDO, CEL, NWC, LLL, ORNL, NADC, LBL, NRL
Geothermal Energy	LASL, NWC, LLL, ORNL, ERL, LBL, USGS
Heating and Cooling Systems	NOSC, LBL, MERADCOM, TARADCOM, LASL, CEL, LLL, KSC, LaRC, ORNL

APPLICATION AREA	LABORATORY
Miscellaneous Energy Conversion and Storage.	MERADCOM, CEC, AFAPL, LASL, CEL, LLL, NUSC, LBL, NSWC, CEEDO, LeRC, KSC, ORNL
Policies, Regulations and Studies.	LASL, NWC, LLL, LBL, BNL
Selected Studies in Nuclear Technology	BNL, LASL, LLL, ORNL, LBL, WES
Solar Energy	MERADCOM, CEC, AFAPL, CERL, LASL, NWC, LLL, ORNL, NUSC, CEL, LBL, BNL, NOSC, CEEDO, KSC, LaRC
Reserves	LLL, NOSC, ORNL
General.	CEC, CERL, LASL, LLL, ORNL, NADC, LBL, NWSC, BNL, CEEDO, NWC, LeRC, USGS

ENVIRONMENTAL POLLUTION AND CONTROL

Air Pollution and Control. . . .	BNL, NWSC, HDL, MERADCOM, CEC, LBL, AFAPL, TARADCOM, CERL, LASL, ADPG, CEEDO, CEL, NWC, LLL, NBL, NAEC, NSWC, AFGL, TSC, CSL, LeRC, AMD, KSC, LaRC, ORNL
Ecological Assesment	CEL
Marine Pollution Technology. . .	CGRDC
Noise Pollution and Control. . .	NWSC, HEL, NSRDC, MERADCOM, CEC, TARADCOM, CERL, LASL, NOSC, NUSC, NSWC, CEL, TSC, LeRC, AMD, KSC, NWC, LaRC
Solid Wastes Pollution and Control.	NWSC, NRDC, NSRDC, CEC, NCSL, CERL, SL, CEL, LLL, FSR, CSL, CEEDO, WES, KSC, NWC, NAEC, ORNL
Water Pollution and Control. . .	NWSC, NRDC, NSRDC, MERADCOM, CEC, NCSL, CERL, NOSC, CEL, NWC, LLL. NBL, ERL, NADC, CSL, LBL, NBL, CLS, CEEDO, WES, ARRADCOM, KSC, LaRC, NAEC, ORNL

APPLICATION AREA	LABORATORY
Pesticides Pollution and Control	NBL, CSL, WES, KSC
Radiation Pollution and Control	NOSC, BNL, LBL, MERADCOM, LASL, SL, LLL, RADC, NSWC, LeRC, KSC, NWC, ORNL
Environmental Health and Safety	NWSC, LASL, SL, LLL, NBL, NADC, LBL, AMRDC, WES, LeRC, KSC, NWC, ORNL
Environmental Impact Statement	AFWL, LASL, SL, LLL, NBL, ADPG, NWC, CEC, NUSC, CSL, CEEDO, WES, KSC, NWC, CERL, ORNL
General	LASL, ADPG, CEL, ARDC, NADC, LBL, CSL, WES, KSC, ORNL
ENVIRONEMNTAL RESOURCE MANAGEMENT	
Marsh Creation for Wildlife Habitats	WES
Recreation Planning	WES
Fisheries Development	WES
Water-Quality Evaluation	WES
Water-Quality and Ecological Simulation Models	WES
Water-Resources Analysis	WES
Land Treatment of Wastewater	WES
GOVERNMENT INVENTIONS FOR LICENSING	
Biology and Medicine	LASL, NOSC, LLL, LBL, BNL, KSC, LaRC, ORNL
Chemistry	LLL, NUSC, LBL, ORNL, LaRC
Electrotechnology	NOSC, CEL, HDL, KSC, ORNL, LaRC
Food Technology	

APPLICATION AREA	LABORATORY
Instruments	CEL, LLL, NUSC, HDL, LBL, KSC, LaRC, ORNL
Mechanical Devices and Equipment	CEL, NUSC, HDL, NADC, KSC, LaRC, ORNL
Metallurgy	LLL, LBL, KSC, ORNL
Nuclear Technology	LLL, LBL, ORNL
Optics and Lasers	NUSC, KSC, LaRC, ORNL
Ordnance	KSC
General	MERADCOM, LASL, LeRC, NWC, ORNL
HEALTH PLANNING	
Agency Administration and Financial Management	KSC
Community and Population Characteristics	LLL, LBL, ORNL
Data and Information Systems	KSC, ORNL
Economics and Sociology	
Environmental and Occupational Factors	SL, LLL, FSR, NADC, LBL, NWSC, NHRC, NIOSH, KSC, NPRDC, ORNL
Health Care Assessment and Quality Assurance	AMD, KSC
Health Care Forecasting Methodology	
Health Care Delivery Organization and Financial Management	
Health Care Measurement Methodology	KSC
Health Care Needs and Demands	KSC

APPLICATION AREA	LABORATORY
Health Care Utilization	
Health Care Technology	LLL, LBL, CSL, HDL, KSC, ORNL
Health Delivery Plans, Projects and Studies	
Health Education	KSC
Health Resources	KSC
Health-Related Costs	
Legislation and Regulations	MDL
Personal Health Care Services	KSC
Planning Methodology	KCS
General	
INDUSTRIAL AND MECHANICAL ENGINEERING	
Environmental Engineering	NWSC, LBL, TARADCOM, CERL, NUSC, NSWC, NADC, WES, KSC, NWC, ORNL
Hydraulic and Pneumatic Equipment	MERADCOM, CEL, NADC, NOSC, WES HDL, KSC, NWC
Industrial Safety Engineering	MERADCOM, LLL, NADC, KSC, NIOSH, NWC, ORNL
Job Environment	NADC, NWSC, NWC
Manufacturing Processes and Materials Handling	LASL, LLL, NSWC, LBL, NWSC, LeRC, KSC, NWC, AFML
Nondestructive Testing	NOSC, AMMRC, NSRDC, MERADCOM, CEC, ORNL NWSC, CERL, LASL, NWC, LLL, NUSC, AFML, NSWC, NADC, CEEDO, WES, LeRC, KSC, LaRC
Production Planning and Process Controls	CERL, LLL, NWSC, KSC, NWC

APPLICATION AREA	LABORATORY
Plant Design and Maintenance	NWSC, CERL, WES, KSC, NWC
Quality Control and Reliability	NWSC, AMMRC, MERADCOM, LASL, LLL, NSWC, LeRC, KSC, NWC
Tooling, Machinery and Tools	MERADCOM, LASL, LLL, NWSC, LeRC, KSC, NWC
General	NADC, NIOSH, NWC
LIBRARY AND INFORMATION SCIENCE	
Environmental Resource Data Analysis	WES
Information Systems	AMMRC, SL, NWC, LLL, NUSC, NADC, LBL, CSL, WES, HDL, LaRC, KSC, ORNL
Marketing and User Services	WES, NWC
Operations and Planning	NOSC, LLL, RADC, WES, LaRC, ORNL
Personnel	WES
Reference Materials	NOSC, LLL, NUSC, NADC, LBL, AFWL, WES, NWC
General	NADC, WES, NPRDC, ORNL
MATERIALS SCIENCES	
Ablative Materials and Ablation	AMMRC, AFML, LASL, LLL, NAEC, NSWC, NWC, LaRC
Adhesives and Sealants	AMMRC, AFML, LASL, CEL, NWC, LLL, NAEC, HDL, NADC, ARRADCOM, NWC, LaRC
Carbon and Graphite	AFWL, AMMRC, AFML, LASL, LBL, LLL, NWC, LaRC, ORNL
Ceramics, Refractories and Glass	AMMRC, NVEDL, MERADCOM, AFML, AFAPL, LASL, LLL, NUSC, NSWC, LBL, AFWL, ORNL, NWSC, NRL, WES, LeRC, NWC, LaRC, CERL

APPLICATION AREA	LABORATORY
Coatings, Colorants and Finishes	NVEDL, MERADCOM, AFML, LASL, CEL, LLL, NADC, NWSC, WES, NWC, LaRC, CERL, ORNL
Composite Materials	AFWL, AMMRC, NSRDC, MERADCOM, AFAPL, LASL, LLL, NAEC, NSWC, AFML, NADC, WES, LeRC, NWC, LaRC, CERL
Corrosion and Corrosion Inhibition	NWSC, AMMRC, MERADCOM, AFML, LASL, LBL, CEL, LLL, NAEC, NSWC, NADC, CEEDO, WES, LeRC, NWC, LaRC, CERL, ORNL
Elastomers	NWSC, AMMRC, MERADCOM, AFML, LASL, LLL, NSWC, NADC, WES, NWC, LaRC
Fibers and Textiles	NRDC, MERADCOM, AFML, LLL, NSWC, NADC, WES, NWC, FBI
Iron and Iron Alloys	AMMRC, NSRDC, AFML, LASL, LLL, NWSC, NADC, LBL, NSWC, WES, LeRC, NWC, CERL, ORNL
Lubricants and Hydraulic Fluids	NSRDC, MERADCOM, AFML, AFAPL, LLL, NAEC, NSWC, NADC, NWSC, LeRC, NWC
Materials Degradation and Fouling	AMMRC, NSRDC, MERADCOM, AFML, NWSC, NADC, WES, CEL, NWC, CERL, NAEC, NSWC, ORNL
Miscellaneous Materials	AFML, LASL, LLL, NSWC, NADC, WES, NWC
Nondestructive Testing	NAEC, NRL, WES, NWC, ORNL
Nonferrous Metals and Alloys	AMMRC, NSRDC, AFML, AFAPL, LASL, LLL, NSWC, LBL, NWSC, WES, LeRC, NWC, LaRC, CERL, ORNL
Plastics	NOSC, AMMRC, AFML, LASL, NWC, LLL, HDL, NSWC, CEL, NADC, WES, LeRC, ARRADCOM, LaRC, CERL
Refractory Metals and Alloys	AMMRC, AFML, LASL, LLL, NSWC, NADC, LeRC, NWC, ORNL

APPLICATION AREA	LABORATORY
Solvents, Cleaners and Abrasives.	MERADCOM, AFML, LLL, NADC, NWC
Wood and Paper Products.	MERADCOM, FSR
General.	LASL, FBI, NADC, NRL, CSL, ARRADCOM, KSC, WES

MATHEMATICAL SCIENCES

Algebra and Number Theory. . . .	NOSC, LASL, LLL, LBL, NWSC, LaRC
Analysis (Mathematics)	BNL, LASL, NWC, LLL, NSWC, NADC, NOSC, KSC, LaRC, NWSC, ORNL
Geometry	LASL, LLL, NSWC, LBL, NOSC
Mathematical Logic	BNL, AFWAL, LASL, NWC, LLL, NSWC, NOSC, LaRC, ORNL
Operations Research.	AFWL, NWSC, NRDC, NCSL, AFWAL, CERL, LASL, LBL, NOSC, NWC, LLL, NUSC, HDL, NSWC, NADC, WES, KSC, NPRDC
Statistical Analysis	NOSC, BNL, LBL, AFWAL, CERL, LASL, NWC, LLL, NSWC, NADC, CSL, KSC, NPRDC, NWSC, LaRC, ORNL
Systems Analysis	CSL
General.	BNL, ETL, AFWAL, LASL, LLL, NUSC, LBL, NWC, ARRADCOM

MEDICINE AND BIOLOGY

Anatomy.	NOSC, AMD, ORNL
Biochemistry	NOSC, LASL, LLL, NBL, NADC, CSL, LBL, NHRC, ORNL
Botany	FSR, CSL, ETL, WES, ORNL
Clinical Chemistry	MDL, LBL
Clinical Medicine.	CSL, LBL, AMD

APPLICATION AREA	LABORATORY
Cytology, Genetics and Molecular Biology.	LASL, LLL, NADC, LBL
Dentistry.	AMRDC
Ecology.	SL, ADPG, LLL, FSR, CSL, LBL, NOSC, WES, ORNL
Electrophysiology.	MDL, LBL, NOSC
Hematology	MDL, AMRDC, ORNL
Immunology	MDL, LASL, NBL, FBI
Microbiology	NWSC, NRDC, MDL, SL, ADPG, LLL, NBL, ORNL
Nutrition.	NRDC, NOSC
Occupation/Physical Therapy and Rehabilitation	NHRC
Parasitology	
Pathology.	LBL
Pest Control	WES
Pharmacology and Pharmacological Chemistry.	NBL, CSL
Psychophysiology	NADC, NHRC
Physiology	NCSL, NADC, CSL, AMD
Psychiatry	NHRC
Public Health and Industrial Medicine	LASL, NBL, LBL, AMRDC
Radiobiology	LASL, LLL, NADC, LBL, BNL, NRL, LeRC AMD, ORNL
Stress Physiology.	NADC, LBL, NHRC, AMD
Surgery.	
Toxicology	LASL, ADPG, NBL, CSL, NWSC, AMD, NWC, ORNL
Zoology.	NOSC, WES, ORNL
General.	BNL, NIOSH, ARRADCOM, KSC, ORNL

APPLICATION AREA	LABORATORY
NATURAL RESOURCES AND EARTH SCIENCES	
Cartography	ETL, LBL, USGS
Forestry	NWSC, CEC, FFL, SO, RM, SE, NE, INT, NC, PNW, PSW, FSR, BIFC, CEEDO, ORNL
Geology and Geophysics	AFWL, LASL, SL, LLL, AFGL, LBL, USGS, WES, KSC, ORNL
Hydrology and Limnology	LLL, USGS, WES, ORNL
Mineral Industries	LASL, LLL, FSR, USGS
Natural Resource Management	CEC, FSR, NWSC, CEEDO, ORNL
Natural Resource Surveys	CERL, LASL, LLL, FSR, AFGL, USGS, LeRC, ORNL
Snow, Ice and Permafrost	NSWC, WES, LeRC, CEL
Soil Sciences	AFGL, AFWL, WES, NWC
General	ETL, LASL, WES, ORNL
NAVIGATION, GUIDANCE AND CONTROL	
Control Devices and Equipment	NOSC, AFWL, NSWC, AFAL, LASL, SL, NWC, NUSC, NADC, KSC, LaRC
Guidance Systems	NOSC, NWSC, AFAL, NWC, NUSC, NSWC, NADC, KSC, LaRC
Marine Navigation Technology	CGRDC
Navigation and Guidance System Components	NOSC, NWC, NSWC, NADC, NWSC, ETL, LaRC, KSC
Navigation Systems	NWSC, ETL, NCSL, AFAL, NUSC, NSWC, NADC, WES, KSC, LaRC
General	AFA, TSC, NWC, LaRCL
NUCLEAR SCIENCE AND TECHNOLOGY	
Fusion Devices (Thermonuclear)	LASL, ORNL, LBL, LaRC
Isotopes	LASL, LLL, NSWC, NADC, LBL, AMD, ORNL

APPLICATION AREA	LABORATORY
Nuclear Auxiliary Power Systems	AFWL, AFAPL, LASL, LLL, NSWC, LaRC
Nuclear Explosions and Devices	AFWL, NWSC, LASL, CEL, NSWC, WES, ORNL
Nuclear Instrumentation	NOSC, BNL, AFWL, LASL, LLL, ORNL, HDL, NSWC, LBL, WES
Radiation Shielding, Protection and Safety	NOSC, AFWL, LASL, LLL, NSWC, LBL, WES, ORNL
Radioactive Wastes and Radioactivity	NOSC, LASL, LLL, BNL, WES, ORNL
Reactor Engineering and Nuclear Power Plants	AFWL, LASL, LLL, ORNL, NSWC
Reactor Fuels and Fuel Processing	LASL, LLL, ORNL
Reactor Materials	LASL, LLL, ORNL
Reactor Physics	AFAPL, LASL, LLL, NSWC, AFWL, ORNL
General	LASL, BNL, KSC, ORNL

OCEAN TECHNOLOGY AND ENGINEERING

Biological Oceanography	NBL, NUSC, LBL, NOSC
Domestic and Polar Ice Technology	CGRDC
Dynamic Oceanography	LASL, NUSC, NOSC, WES, WFC
Effects of Ocean-Dumping of Dredged Material	WES
Hydrography	NOO, WES
Marine Engineering	NOO, NSRDC, NUSC, NOSC, WES
Marine Fire and Safety Research	CGRDC
Marine Geophysics and Geology	CEL, NADC, NOSC, USGS, NOO, WES, NWC

APPLICATION AREA	LABORATORY
Oceanographic Vessels, Instruments and Platforms	NOO, CEL, NUSC, NADC, NOSC, KSC, NWC, LaRC
Physical and Chemical Oceanography	SL, CEL, NUSC, NADC, NOSC, WES
Search and Rescue Technology	CGRDC
Underwater Construction and Habitats	CEL, NOSC, WES
General	LBL
ORDNANCE	
Ammunition, Explosives and Pyrotechnics	AFWL, NWSC, AMMRC, LASL, SL, ADPG, NSWC, CSL, ARRADCOM, KSC, NWC
Armor	AMMRC, LASL, NWC, CSL, NSWC, WES
Bombs	NWSC, LASL, SL, NWC, NSWC, ARDC, WES
Combat Vehicles	NWSC, WES, NWC
Detonations, Explosion Effects and Ballistics	AFWL, NWSC, AMMRC, LASL, SL, CEL, NWC, NSWC, CSL, WES, ARRADCOM, KSC
Fire Control and Bombing Systems	NWSC, SL, NWC, NSWC, NADC, NOSC, ARRADCOM
Guns	NSWC, ARDC, NWSC, NWC
Rockets	LASL, NSWC, WFC, NWC
Underwater Ordnance	LASL, NUSC, NSWC, NWSC, NOSC, NWC
General	LASL, NSWC, NWC
PHOTOGRAPHY AND RECORDING DEVICES	
Holography	NOSC, AMMRC, ETL, AFAL, AFAPL, NADC LASL, SL, NWC, LLL, NUSC, NSWC, LeRC, KSC, NWC

APPLICATION AREA	LABORATORY
Photographic Techniques and Equipment	NWSC, NVEDL, ETL, AFAL, LASL, SL, AFWL, ADPG, LLL, NUSC, NSWC, NADC, WES, LeRC, KSC
Recording Devices	NOSC, NWSC, NVEDL, ETL, AFAL, LASL, LLL, NUSC, NADC, WES, KSC
General	NSWC, NADC, KSC
PHYSICS	
Acoustics	NOSC, NWSC, AFWL, MERADCOM, AFAL, CERL, LASL, SL, LLL, NUSC, NSWC, NADC, WES, LeRC, KSC, NWC, LaRC
Fluid Mechanics	NOSC, AFWL, AFML, AFAPL, LASL, SL, LLL, NUSC, HDL, NSWC, NADC, WES, LeRC, LaRC
Optics and Lasers	NWSC, AMMRC, NVEDL, AFAL, AFAPL, SL, AFWL, LASL, NWC, LLL, NUSC, HDL, NSWC, AFGL, NADC, NRL, WES, LeRC, AMD, KSC, LaRC, NOSC, ORNL
Solid State Physics	NOSC, AMMRC, NVEDL, AFAL, AFAPL, SL, LASL, NWC, LLL, HDL, NSWC, NADC, LBL, NRL, LeRC, ARRADCOM, LaRC, ORNL
Structural Mechanics	NOSC, NWSC, AMMRC, MERADCOM, AFWAL, NADC, AFAPL, CERL, SL, NWC, LLL, NUSC, NRL, WES, LeRC, CEL, LaRC, ORNL
Plasma Physics	AFWL, LBL, AFAL, LASL, SL, LLL, HDL, NSWC, NADC, LeRC, LaRC, ORNL
Radio Frequency Waves	MERADCOM, AFAL, LASL, SL, LL, NUSC, HDL, NSWC, AFGL, AMD, KSC, NWC, LaRC
General	MERADCOM, LASL, SL, HDL, NSWC, LBL, BNL, NRL, CSL, ARRADCOM, NWC, LaRC
PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS	
Economic and Community Development	CEEDO
Education	NUSC

APPLICATION AREA	LABORATORY
Energy	NOSC, BNL, AMMRC, MERADCOM, CEC, NWC, LLL, NUSC, TSC, CEEDO, LBL, WES, LeRC, KSC, LASL, ORNL, LaRC
Environment	NOSC, BNL, MERADCOM, CEC, LASL, SL, ADPG, LLL, NUSC, NSWC, CSL, NVEDL, LBL, WES, LeRC, KSC, CEEDO, NBL, ORNL, LaRC
Finance	
Forensics (Explosives)	ARRADCOM
Human Resources	NADC, KSC
Police, Fire and Emergency Service	NVEDL, MERADCOM, CEC, LASL, NOSC, NWC, LLL, FEL, NUSC, NSWC, FBI, BIFC, CEEDO, FFL, KSC, LaRC
Transportation	FHRS, MERADCOM, LASL, SL, LLL, TSC, NUSC, KSC
General	LASL, NUSC, LBL, KSC, NWC, LaRC, ADPG
TRANSPORTATION	
Air Transportation	BIFC, TSC, CEEDO, WES, HDL, LaRC
Global Navigation Systems	NOSC, NADC, TSC, LaRC
Marine Traffic Management	CGRDC
Marine and Waterway Transportation	NSRDC, MERADCOM, NCSL, TSC, WES, NWC
Metropolitan Rail Transportation	LBL, TSC
Offroad Mobility or Transportation	WES
Pipeline Transportation	HDL, MERADCOM, TSC, KSC
Railroad Transportation	MERADCOM, TSC, WES, NWC
Road Transportation	LBL, TSC, WES, HDL, NWC, LeRC
Transportation Safety	LaRC
General	LASL, TSC, NWC, SL

APPLICATION AREA	LABORATORY
URBAN AND REGIONAL TECHNOLOGY AND DEVELOPMENT	
Communications	KSC
Economic Studies	CERL, LBL
Emergency Services and Planning	LASL, KSC
Environmental Management and Planning	NOSC, MERADCOM, CEC, CERL, FSR, CEEDO, WES, KSC
Fire Services, Law Enforcement and Criminal Justice	NVEOL, MERADCOM, NUSC, FBI
Health Services	KSC
Housing	CERL, FSR
Recreation	WES
Regional Administration and Planning	
Social Services	
Transportation and Traffic Planning	FHRS, NSWC, TSC, CEEDO
Urban Administration and Planning	
General	NVEDL

U.S. ARMY DUGWAY PROVING GROUND
Dugway, Utah 84022

APPLICATION AREA	EXPERTISE
ATMOSPHERIC SCIENCES	
Meteorological Instruments and Instrument Platforms	Instrumented vans, computer control and data logging, microwave link.
General	Sophisticated computer modeling of aerosol transport and diffusion. Fluorescent tracer technology and equipment.
CHEMISTRY	
Analytical Chemistry	Modern analytical instrumentation. Trace quantity analysis. Capacity for large number of samples. Fate of pesticides in soil, air and water.
ENVIRONMENTAL POLLUTION AND CONTROL	
Air Pollution and Control	Particulate and gas sampling and analysis. Effects of air pollutants on aerosolized viable particles.
Environmental Impact Assessments and Statements	Preparation of assessments. Review of statements.
General	R&D on characterizing pollution sources, field sampling, ecological baseline studies. Chambers instrumented and controlled to test devices for pollutant emissions.
MEDICINE AND BIOLOGY	
Ecology	Baseline surveys.
Microbiology	Pilot production of cells, sampling of aerosols containing viable bacteria/virus, capability for analysis of large numbers of samples.

APPLICATION AREA	EXPERTISE
Toxicology	Animal holding facilities, faunal colony, scientific staff experienced in toxicological determinations.
ORDNANCE	
Ammunition, Explosives	EOD, testing, effects measurement, handling, storage.
PHOTOGRAPHIC AND RECORDING DEVICES	
Photographic Techniques and Equipment	Color/black and white film processing, stills, movies, film reading/data reduction, graphic arts, documentary films, cinetheodolites.
PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS	
Environmental	Assessment preparation, analysis of environmental effects including field evaluations, ambient monitoring, epidemiology, arbovirology.
General	Multidisciplined study teams for problem definition.

CONTACT: M. A. Rothenberg
ATTN: STEDP-SC
U.S. Army Dugway Proving Ground
Dugway, Utah 84022
Telephone: (801) 522-3314
Autovon: 789-3314

U.S. AIR FORCE AVIONICS LABORATORY
Wright Patterson AFB, Ohio 45433

APPLICATION AREA	EXPERTISE
AERONAUTICS AND AERODYNAMICS	
Avionics	Solid state electronic device and integrated circuit technology; electro-optic device to provide the basic electronic elements.
DETECTION AND COUNTERMEASURES	
Acoustic Detection	Electronic and electro-optic detection, jamming and deception techniques.
Electromagnetic and Acoustic Countermeasures	Jamming and deception techniques.
Infrared and Ultraviolet Detection	Infrared reconnaissance sensor subsystems. Advanced infrared subsystems for applying ultraviolet technology to current and projected surveillance and intercept operational requirements.
Magnetic Detection	Techniques for metal detection.
Optical Detection	Electro-optic detection.
Personnel Detection	Photographic, electro-optical, infrared and radar reconnaissance sensor systems.
Radio Frequency Detection	Radar, infrared.
ELECTROTECHNOLOGY	
Antennas	Radar reconnaissance sensor subsystems.
Circuits	Solid state electronic device and integrated circuit technology.
Electromechanical Devices	Solid state electronic device; radar and microwave technology; lasers and electro-optic device to provide the basic electronic elements applicable to weapons systems.

APPLICATION AREA	EXPERTISE
Electron Tubes	Electro-optical device.
NAVIGATION, GUIDANCE AND CONTROL	
Control Devices and Equipment	Control display, aerodynamic stability, handling qualities, control equipment and instrumentation, portable ILS equipment, and use of the pilot as a control element.
Guidance Systems	Inertial reference and guidance technology.
Navigation Systems	Flight path control, control displays, portable ILS equipment.
General	Quick-response solutions to critical Air Force problems.
PHOTOGRAPHY AND RECORDING DEVICES	
Holography	Techniques, materials, and uses of holography and holograms; acoustic holography.
Photographic Techniques and Equipment	Electronic image evaluator, distortion calibrator/camera.
Recording Devices	Mann precision comparator and the world's largest optical collimator (100" diameter).
PHYSICS	
Acoustics	Generation and transmission of sound through various media or enclosures. Includes ultrasonic and infrasonic radiation.
Optics and Lasers	Generation and propagation of electromagnetic waves on the infrared, visible, and ultraviolet region of the spectrum. Theory, design, and performance of optic equipment. Includes lasers and masers.

APPLICATION AREA	EXPERTISE
Solid State Physics.	Physical properties of solids as related to their structure. Fundamental research and theoretical studies of semiconductors; band structures of solids. Includes crystallography and superconductivity.
Plasma Physics	Mathematical, computational, experimental, diagnostics; laser-plasma interactions.
Radio Frequency Waves.	Radar and microwave technology.

CONTACT:
James G. Johnson
U.S. Air Force Avionics Laboratory
Wright Patterson, AFB, Ohio 45433
Telephone: (513) 255-5804
Autovon: 785-5804

AIR FORCE AERO PROPULSION LABORATORY
Wright-Patterson AFB, Ohio 45433

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Management Practice.	Record keeping, planning, scheduling, organization, coordination, decision making, policy making, modernization; cost effectiveness; management analysis.
Management Information	Performance, budgeting, and accounting, or other techniques used to permit management to establish and direct plans, including the measurement and evaluation of results. Includes planning, programming and budgeting (PPB), PERT, etc.
Research Program Administration and Technology Transfer. . . .	Research management, development planning and forecasting; contract management; internal and external consultation in R&D organizations; identification and communication of research needs and technical problem areas.
AERONAUTICS AND AERODYNAMICS	
Aerodynamics	Operational flight characteristics and problems of aerodynamically configured bodies as they are affected by the dynamics of phenomena relating to boundary layer, drag, laminar and turbulent flow, compressible flow, lift aerodynamic heating, vortex flow, wake, etc. in aerodynamic regimes (see also Physics--Fluid Mechanics; for missile reentry dynamics).

APPLICATION AREA	EXPERTISE
CHEMISTRY	
Analytical Chemistry	Techniques and instrumentation for the separation and analysis of individual compounds or specific groups of compounds, both inorganic and organic. Includes qualitative, volumetric, gravimetric, optical, spectroscopic, electrochemical, ion exchange, chromatographic analysis and methods; treatment of analytic data; forensic chemistry.
ELECTROTECHNOLOGY	
Circuits	Circuit theory, network analysis, filters, amplifiers, oscillators, logic circuits, printed circuits, electronic modules, commutators, power supply circuits, waveform generators, analog to digital converters, phase locked systems, etc.
Electromechanical Devices	Electric motors, relays, switches, conductors, etc.
Power and Signal Transmission Devices	Transmission lines, electric wire and cable, waveguides, electric fuses, circuit breakers; electromagnetic and electric filters, etc.
Resistive, Capacitive, and Inductive Components	Resistors, capacitors, inductors, transformers, electromagnets, potentiometers, thermistors, delay lines, transducers, crystal resonators, etc.; includes miscellaneous and basic components.
Semiconductor Devices	Transistors, semiconductor diodes, integrated circuits, etc.

APPLICATION AREA	EXPERTISE
ENERGY	
Energy Sources	Fuel resources and trends; new technology affecting supply. Includes coal, petroleum, natural gas, solar energy, refuse, hydrogen, etc.
Energy Use, Supply and Demand	Energy consumption and capacity; supply and demand; supply and projections; technological advances and impacts on the industry.
Power and Heat Generation	Design and operation of heating and electric power plants and equipment; residential energy production and its environmental aspects; solar cooling and heating.
Energy Conversion and Storage	Conversion studies not applied to commercial, industrial, or residential use; theory; new technology. Includes nuclear converters, solar cells, heat storage, batteries, fuel cells, magnetohydrodynamics, electric generators, turbogenerators, mechanical conversion, thermoelectric and thermionic conversion, photoelectric and photovoltaic conversion, thermonuclear power.
Fuel Conversion Processes	Physical and chemical methods for converting fuels to increase their availability by improving handling, storage, or use. Includes coal liquification and gasification, fuel desulfurization, oil shales conversion, and refineries; new technology.
Engines and Fuels	Production, performance, storage, etc. of all types of solid, liquid, or gaseous fuels (except rocket fuels), reciprocating, rotating, jet, and gas turbine engines and components without specific application.

APPLICATION AREA	EXPERTISE
ENVIRONMENTAL POLLUTION AND CONTROL	
Air Pollution and Control	Air pollution from turbine engine exhausts, sampling and analytical techniques, and equipment; air pollution chemistry; atmospheric motion; laws; public administration; economics.
MATERIALS SCIENCES	
Ceramics, Refractories, and Glass	Ceramic materials; non-metallic refractory materials; cermets.
Composite Materials	Materials composed of two or more physically distinct constituents. Includes reinforced plastics, carbon or graphite composites, laminates, metal matrix compocites, fiber wound composites, filled composites, particulate composites, etc.
Lubricants and Hydraulic Fluids	Chemical, mechanical, and physical properties, performance, and production of turbine engine oils, lubricants, and hydraulic fluid additives.
Nonferrous Metals and Alloys	Microstructure, physical properties and mechanical properties; phase studies.
NUCLEAR SCIENCE AND TECHNOLOGY	
Nuclear Auxiliary Power Systems	SNAP technology, both isotropic and reactor.
PHOTOGRAPHY AND RECORDING DEVICES	
Holography	Techniques, materials, and uses of holography and holograms; acoustic holography.

APPLICATION AREA	EXPERTISE
PHYSICS	
Fluid Mechanics	Theoretical and experimental studies of the dynamics and statics of fluids and of relative motion between fluids and solid bodies. Includes aerodynamics and hydrodynamics.
Optics and Lasers	Generation and propagation of electromagnetic waves on the infrared, visible, and ultraviolet region of the spectrum. Theory, design, and performance of optical equipment.
Solid State Physics	Physical properties of solids as related to their structure. Fundamental research and theoretical studies of semiconductors; band structure of solids. Includes crystallography and superconductivity.
Structural Mechanics	Dynamics and statics of solid bodies; kinetics, kinematics, shock and vibration, stress analysis.

CONTACT: Leo S. Harootyan Jr.
U.S. Air Force Aero Propulsion
Laboratory
AFAPL-DOY
Wright-Patterson AFB, Ohio 45433
Telephone: (513) 255-3428
Autovon: 785-3428

AFGL
(Northeast Region)

AIR FORCE GEOPHYSICS LABORATORY
Hanscom Air Force Base
Bedford, Massachusetts 01731

APPLICATION AREA	EXPERTISE
ATMOSPHERIC SCIENCES	
Meteorological Data Collection, Analysis and Weather Forecasting	Atmospheric dynamics, densities and winds as measured from satellites, rockets and balloons and remote probing techniques. Expertise in assessing weather and climate at remote locations, in particular as affecting aviation.
CHEMISTRY	
Physical Chemistry	Application of physical chemistry techniques such as mass spectrometers and molecular beam apparatus to study chemical reaction rates in the natural atmosphere and stratosphere. Studies of photochemical processes.
ENVIRONMENTAL POLLUTION AND CONTROL	
Air Pollution	Expertise in contamination of atmosphere by aircraft exhaust products or fuel dumping.
NATURAL RESOURCES AND EARTH SCIENCES	
Natural Resource Surveys	Expertise in all phases of geodetics and gravity, both ground based and from aircraft and satellites.
Geology and Geophysics	Expertise in seismology and geology, crustal physics.
PHYSICS	
Optics and Lasers	Expertise in infrared and passive microwave remote sensing, in particular as applied to atmospheric studies.

APPLICATION AREA	EXPERTISE
Radio Frequency Waves.	Expertise in all aspects of ionospheric physics and electromagnetic propagation through natural aerospace environment and as disturbed by solar flares.

CONTACT: John N. Howard
Air Force Geophysics Laboratory
Hanscom Air Force Base
Bedford, Massachusetts 01731
Telephone: (617) 861-3161
Autovon: 478-3161

U.S. AIR FORCE MATERIALS LABORATORY
Wright Patterson AFB, Ohio 45433

APPLICATION AREA	EXPERTISE
CHEMISTRY	
Analytical Chemistry	Chemical ionization mass spectroscopy, high resolution mass spectroscopy, gas chromatography and thermolytic dissociation, emission spectrographic and atomic absorption, gas analyses of metals, wet chemical analysis and X-ray fluorescence.
Industrial Chemistry and Chemical Process Engineering	Investigate the physical metallurgy of titanium, aluminum, superalloys, refractory metals and alloys.
Polymer Chemistry	Research on the synthesis of polymeric and nonpolymeric, organic and inorganic chemical compounds and research on their characterizations and properties.
INDUSTRIAL AND MECHANICAL ENGINEERING	
Manufacturing Processes and Materials Handling	Chemical and metallurgical processing, metal and nonmetal fabrication techniques and thermionic and solid state device processing.
Nondestructive Testing	Capability in X-ray, eddy current, ultrasonic, microwave, and optical techniques.
MATERIALS SCIENCES	
Ablative Materials and Ablation	Development and characterization of ablative plastics and composites. Ablative, thermochemical and thermostructural behavior of ablative plastics investigated to determine very high temperature materials properties and characteristics including erosion rate, char yield, surface and internal temperatures, gas-solid-liquid residues, compositions and similar characteristics.

APPLICATION AREA	EXPERTISE
Adhesives and Sealants	Development and characterization of structural adhesives and sealants.
Carbon and Graphite	Fuel technology based on graphites and carbonaceous materials.
Ceramics, Refractories, and Glass	Research and development for ceramics.
Coatings, Colorants, and Finishes	Research and exploratory development for preparing coating materials.
Composite Materials	Composite testing based on a closed-loop hydraulic system which can control load or displacement imposed on a specimen.
Corrosion and Corrosion Inhibition	Development of special coatings and materials that are abrasion resistant to corrosion and corrosion coatings.
Elastomers	Elastomer Materials Facility--conducts syntheses, compounding, processing, fabrication and evaluation of elastomeric and complaint materials, e.g., vulcanized elastomer compounds; analyzing polymers through ultraviolet light and gas; static and dynamic evaluation of elastomeric materials.
Fibers and Textiles	Fibrous Materials Facility--research in: flexible fibrous structures and high modulus reinforcing agents; physical and chemical characterization of fibers; weaving and evaluation of woven structures; environmental aging, high temperature reactions of fibers.
Iron and Iron Alloys	Metallurgical Facility--research includes the capability for the investigation of deformation, aging diffusion, phase relationships and influence of defect structure on properties of metals and alloys.

APPLICATION AREA	EXPERTISE
Lubricants and Hydraulic Fluids	Chemical, mechanical and physical properties, performance, and production of all types of oils, lubricants, and hydraulic fluids; lubricant and hydraulic fluid additives.
Materials Degradation and Fouling	Aging, erosion, wear, weathering, deterioration, decay; effects of radiation on materials; biodeterioration, including fungus deterioration; corrosion and corrosion inhibition; husting; embrittlement; exfoliation.
Miscellaneous Materials	Leather, fur, refrigerants, straw, petroleum, waxes, etc.
Nonferrous Metals and Alloys	Microstructure, physical properties and mechanical properties.
Plastics	Development and characterization of new structural plastics and composites, structural adhesives and ablative plastics and composites.
Refractory Metals and Alloys	Physical metallurgy of refractory metals and alloys.
Solvents, Cleaners, and Abrasives	Abrasive resistant coatings.
PHYSICS	
Fluid Mechanics	Theoretical and experimental studies of the dynamics and statics of fluids and of relative motion between fluids and solid bodies. Includes aerodynamics and hydrodynamics.

CONTACT:
LT COL Gordon Hermann
Air Force Materials Laboratory
ATTN: AFML/NA
Wright-Paterson AFB, Ohio 45433
Telephone: (513) 255-4528
Autovon: 785-4528

U.S. AIR FORCE WRIGHT AERONAUTICAL LABORATORY
Wright Patterson AFB, Ohio 45433

AERONAUTICS AND AERODYNAMICS

APPLICATION AREA	EXPERTISE
Aerodynamics	Aerodynamic stability, flight mechanics, aerothermodynamics, gasdynamics, flight performance; structural materials studies--load bearing materials for wide applications to aerodynamic aircraft and missiles.
Aeronautics	Flight control; vehicle dynamics; vehicle subsystems; flight mechanics; structures; prototype.
Aircraft	Flight control; flight vehicle prototypes, vertical/short take-off and landing (V/STOL), remotely piloted vehicles; structures--flight loads, atmospheric turbulence, analysis methods, flight load sensors; flight mechanics.
Parachutes and Decelerators	Reentry systems.
Avionics	Solid state electronic device and integrated circuit technology; electro-optic device to provide the basic electronic elements.
Test Facilities and Equipment	Structures Test Facility; Fifty Megawatt Facility; Sonic Fatigue Facility; Landing Gear Test Facility.

MATHEMATICAL SCIENCES

APPLICATION AREA	EXPERTISE
Mathematical Logic	General competence.
Operations Research	All-weather landing systems, air cushion landing gear systems, cryogenic coolers, and inlet/nozzle/flight vehicle integration, and flight control system simulation.
Statistical Analysis	Concepts, data design criteria, and prediction and analysis techniques.

APPLICATION AREA	EXPERTISE
General	Stability and control design handbooks, computer-based design techniques, matrix structural analysis techniques, flutter prediction techniques.
PHYSICS	
Structural Mechanics	Dynamics and statics of solid bodies; kinetics, kinematics, shock and vibration, stress analysis.

CONTACT: Mr. Rudy Bevins
U.S. Air Force Wright Aeronautical
Laboratory
Wright Patterson AFB, Ohio 45433
Telephone: (513) 255-2803
Autovon: 785-2803

AIR FORCE WEAPONS LABORATORY
Kirtland AFB, New Mexico 87117

APPLICATION AREA	EXPERTISE
AERONAUTICS AND AERODYNAMICS	
Aerodynamics	Structures, supersonic flow, unusual aircraft modification, aerodynamic laser cavities.
CIVIL ENGINEERING	
Soil and Rock Mechanics	Ground motion, response to high pressure shock waves, ground shock, soil classification and mechanical characteristics.
COMPUTER, CONTROL AND INFORMATION THEORY	
Computer Hardware	Computer center operation.
Computer Software	Programming.
Control Systems and Control Theory	Precision positioning and tracking system.
DETECTION AND COUNTERMEASURES	
Infrared and Ultraviolet Detection	Infrared measurements, infrared imaging.
Nuclear Explosion Detection	Nuclear detection, nuclear detection system, nuclear survey instrumentation, radiological health instrumentation.
ELECTROTECHNOLOGY	
Circuits	Theory, circuit design, printed circuit fabrication.
Electro-optical Devices and Systems	Detectors, low light level imaging systems, infrared imaging systems, display techniques.

APPLICATION AREA	EXPERTISE
ENVIRONMENTAL POLLUTION AND CONTROL	
Environmental Impact Statements	Environmental engineering.
LIBRARY AND INFORMATIONAL SCIENCES	
Reference Materials	Technical Library.
MATERIALS SCIENCES	
Carbon and Graphite	Carbon phenolics, high temperatures graphite.
Ceramics, Refractories and Glass	Optical materials.
Composite Materials	Reentry vehicle materials.
MATHEMATICAL SCIENCES	
Operations Research	Models, war games, analytical evaluations.
NATURAL RESOURCES AND EARTH SCIENCES	
Soil Science	Mechanical properties, shock response, cratering.
Geology and Geophysics	Characterization, high pressure response, seismology, seismic survey, ground shock spectrum.
NAVIGATION, GUIDANCE AND CONTROL	
Control Devices and Equipment	High precision pointing and tracking systems.
NUCLEAR SCIENCE AND TECHNOLOGY	
Nuclear Auxiliary Power System	Isotope generators, nuclear safety.

AIR FORCE WEAPONS LABORATORY
Kirtland AFB, New Mexico 87117

APPLICATION AREA	EXPERTISE
AERONAUTICS AND AERODYNAMICS	
Aerodynamics	Structures, supersonic flow, unusual aircraft modification, aerodynamic laser cavities.
CIVIL ENGINEERING	
Soil and Rock Mechanics	Ground motion, response to high pressure shock waves, ground shock, soil classification and mechanical characteristics.
COMPUTER, CONTROL AND INFORMATION THEORY	
Computer Hardware	Computer center operation.
Computer Software	Programming.
Control Systems and Control Theory	Precision positioning and tracking system.
DETECTION AND COUNTERMEASURES	
Infrared and Ultraviolet Detection	Infrared measurements, infrared imaging.
Nuclear Explosion Detection	Nuclear detection, nuclear detection system, nuclear survey instrumentation, radiological health instrumentation.
ELECTROTECHNOLOGY	
Circuits	Theory, circuit design, printed circuit fabrication.
Electro-optical Devices and Systems	Detectors, low light level imaging systems, infrared imaging systems, display techniques.

APPLICATION AREA	EXPERTISE
ENVIRONMENTAL POLLUTION AND CONTROL	
Environmental Impact Statements	Environmental engineering.
LIBRARY AND INFORMATIONAL SCIENCES	
Reference Materials.	Technical Library.
MATERIALS SCIENCES	
Carbon and Graphite.	Carbon phenolics, high temperatures graphite.
Ceramics, Refractories and Glass.	Optical materials.
Composite Materials.	Reentry vehicle materials.
MATHEMATICAL SCIENCES	
Operations Research.	Models, war games, analytical evaluations.
NATURAL RESOURCES AND EARTH SCIENCES	
Soil Science	Mechanical properties, shock response, cratering.
Geology and Geophysics	Characterization, high pressure response, seismology, seismic survey, ground shock spectrum.
NAVIGATION, GUIDANCE AND CONTROL	
Control Devices and Equipment. .	High precision pointing and tracking systems.
NUCLEAR SCIENCE AND TECHNOLOGY	
Nuclear Auxiliary Power System	Isotope generators, nuclear safety.

APPLICATION AREA	EXPERTISE
Nuclear Explosions and Devices	Nuclear weapons, nuclear weapons effects, survivability/vulnerability of Air Force systems.
Nuclear Instrumentation	X-ray detectors, EMP detectors, photodetectors, nuclear survey instrumentation, radiological health instrumentation.
Radiation Shielding, Protection and Safety	Radiation shielding codes.
Reactor Engineering and Nuclear Power Plants	Reactor safety, neutron transport.
Reactor Physics	Reactor safety analysis.
ORDNANCE	
Ammunition, Explosives and Pyrotechnics	Detonators, energetics, explosives, air blast simulation techniques, ground shock simulation techniques.
Detonators, Explosion Effects and Ballistics	Blast effects, computer simulation of large explosions, ground shock, ground motion.
PHOTOGRAPHY AND RECORDING DEVICES	
Photographic Techniques and Equipment	High speed photography, infrared photography, image converter cameras.
PHYSICS	
Fluid Mechanics	Plasma flow, aerodynamic laser cavities.
Optics and Lasers	High energy lasers, gas dynamic lasers, electro-dynamic lasers, chemical lasers, large optics.

APPLICATION AREA	EXPERTISE
Plasma Physics	Hot dense plasma devices, Z pinches laser heating, relativistic electron beam.

CONTACT:
Dr. Arthur Guenther
Attention: AFWL/CA
Air Force Weapons Laboratory
Kirtland AFB, NM 87117
Telephone: (505) 264-9856/8561
Autovon: 964-9856/8561

USAF AEROSPACE MEDICAL DIVISION
Brooks AFB, Texas 78235

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Research Program Administration and Technology Transfer	Research and development management, planning, and forecasting; contract management; in-house laboratories; consultation.
AERONAUTICS AND AERODYNAMICS	
Aircraft	Noise, vibration, escape systems, environmental control systems windscreens, survivability/vulnerability, high acceleration cockpit, life support systems.
Airports	Noise, land use planning.
Avionics	Controls and display, visually coupled systems, heads up display, electro-optic countermeasures.
Test Facilities and Equipment	Man-rated dynamic environmental simulator, man-rated centrifuge, man-rated acceleration and deceleration impact facility, man-rated climatic chamber.
BIOMEDICAL TECHNOLOGY AND HUMAN FACTORS ENGINEERING	
Biomedical Instrumentation and Bioengineering	An environmental stress facility capable of various atmospheres; and several altitudes, temperature and decompression chambers. A trace gas analysis laboratory equipped with modern analytical instrumentation for all types of

APPLICATION AREA	EXPERTISE
Biomedical Instrumentation and Bioengineering (contd)	trace contaminant detection and analysis in oxygen and other breathing gas systems.
COMMUNICATION	
Communication and Information Theory	Operator workload assessment; controller characteristics for sensor system design; visual processes in the perception of real and displayed information; pattern recognition and information processing by sensory systems.
DETECTION AND COUNTERMEASURES	
Optical Detection	Optically-directed AAA is very effective against free world penetration aircraft. Requires a viable countermeasure to defeat or degrade the human visual tracking apparatus.
ENERGY	
Fuel Conversion Processes	Toxicology of non-petroleum derived jet fuels.
ENVIRONMENTAL POLLUTION AND CONTROL	
Air pollution and control	AMD will develop nationally recognized data on chronic inhalation exposure effects of volatile Air Force chemicals and recommend occupational exposure limits (resulting in Air Force Occupational Safety and Health Standards).
Noise Pollution and Control	Assess biologic hazards, suggest countermeasures, and quantitate acute and delayed biologic effects of nonionizing laser/maser, nuclear flash, radiofrequency, and ionizing radiation on man.

APPLICATION AREA	EXPERTISE
HEALTH PLANNING	
Health Care Assessment and Quality Assurance	The objective of the USAF Health Evaluation and Risk Tabulation (HEART) Program is to develop and demonstrate in an operational environment a prototype system employing verified medical techniques for the identification of Air Force personnel who are at increased risk of developing cardio-vascular disease, and subsequently intervene to reduce that risk.
MEDICINE AND BIOLOGY	
Anatomy	AMD is providing predictions of human body response resulting from exposures to high level multidirectional impacts encountered during ejection, crash, ground impact or other short duration force inputs to the body. This is accomplished by means of a set of computer-based bio-dynamic models capable of describing human body dynamics with great detail and accuracy.
Clinical Medicine	USAF Wilford Hall Medical Center; aeromedical consultation service at USAF School of Aerospace Medicine.
Physiology	Advanced oxygen system for new generation aircraft; a physiologic demand regulator for aircrew breathing gases; acceleration protection for aircrews of advanced tactical aircraft, anti-G mechanical/physiologic systems for advanced high performance aircraft.
Radiobiology	Electromagnetic and particulate radiation hazards in aerospace operations; personnel hazard assessments, safe separation distances, and accurate predictions of man's ability to maximally perform in a laser, radiofrequency, or nuclear radiation environment.

APPLICATION AREA	EXPERTISE
Stress Physiology.	Prediction, assessment, and amelioration of the effects of acceleration forces, thermal extremes, and physiologic workloads.
Toxicology	Occupational and environmental toxic hazards in Air Force operations; the protection of humans by performing toxicology studies with mammalian laboratory animal species; the assessment of toxic effects in other than mammalian forms of life which are of economic or ecologic importance.

NUCLEAR SCIENCE AND TECHNOLOGY

Isotopes	USAF Radioisotope Committee - established to coordinate the administrative and regulatory aspects of licensing, possession, use storage, handling, and disposal of all radioactive material in the Air Force. Acts as a single point of Air Force contact with the U.S. Nuclear Regulatory Commission on all aspects of radioactive material licensing.

PHYSICS

Optics and Lasers.	Safety criteria for developers and users of laser systems; accurately predict hazardous exposure conditions for laser employment; provide performance data and periodic testing of selected laser protective devices and materials in use, and determining the impact of exposure to laser radiation on operational capabilities.
Radio Frequency Waves.	AMD is working to resolve priority problems on the specific bioeffects of phased array radar emission, peak power pulse effects, chronic versus acute effects, combined stress modifiers (including multiple frequencies)

APPLICATION AREA	EXPERTISE
Radio Frequency Waves (Contd).	on RFR permissible exposure levels and/or operational systems safety criteria.

CONTACT: Mr. Thomas D. N. Douthit
Air Force Aerospace
Medical Division
AMD/RDX
Brooks AFB, TX 78235
Telephone: (512) 536-3406
Autovon: 240-3406

DEPARTMENT OF THE ARMY
ARMY MATERIALS AND MECHANICS RESEARCH CENTER
Watertown, Massachusetts 02172

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Management Practice	R&D management analysis-SPIDERCHART.
Management Information Systems	Manufacturing technology M.I.S.
Research Program Administration and Technology Transfer	SPIDERCHART program analysis.
BEHAVIOR AND SOCIETY	
Job Training and Career Development	Quality assurance/NDT inspection school.
BUSINESS AND ECONOMICS	
Domestic Commerce, Marketing and Economics	Market analysis/cost driver studies of major systems.
CHEMISTRY	
Analytical Chemistry	Wet chemical analysis of materials.
COMPUTERS, CONTROL, AND INFORMATION THEORY	
Computer Software	Business analysis, materials analysis, mechanics of materials.
ENERGY	
Engine Studies (Energy Related)	Ceramic engine development.
INDUSTRIAL AND MECHANICAL	
Quality Control and Reliability	QA inspector training program.
Nondestructive testing	Basic research/NDT inspection training.

APPLICATION AREA	EXPERTISE
LIBRARY AND INFORMATION SCIENCES	
Information Systems	Manage materials oriented DoD information analysis centers.
MATERIAL SCIENCE	
Ablative Materials and Ablation	Research and development.
Adhesive and Sealants	Research and development.
Carbon and Graphite	Research and development.
Ceramics Refractories and Glass	Research and development.
Composite Materials	Research and development.
Corrosion and Corrosion Inhibition	Research and development.
Elastomers	Research and development.
Iron and Iron Alloys	Research and development.
Materials Degradation and Fouling	Research and development.
Nonferrous Metals and Alloys	Research and development.
Plastics	Research and development.
Refractory Metal and Alloys	Research and development.
ORDNANCE	
Ammunition, Explosives and Pyrotechnics	R&D/nuclear ammo development.
Armor	Research and development.
Detonation Explosion Effects and Ballistics	Ballistic analysis.

APPLICATION AREA	EXPERTISE
PHOTOGRAPHY AND RECORDING DEVICES	
Holography	Laser holography for NDT.
PHYSICS	
Optics and Lasers	Laser effects on materials.
Solid State Physics	Basic research.
Structural Mechanics	Mechanics of materials.
PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS	
Energy	Review of heat losses.

CONTACT: R. L. Farrow, Chief
Technology Transfer Division
ATTN: Code DRXMR-PT
Army Materials And Mechanics
Research Center
Watertown, Massachusetts 02172
Telephone: (617) 923-3523
Autovon: 684-3523

ARMY MEDICAL RESEARCH AND DEVELOPMENT COMMAND
Frederick, Maryland 21701

APPLICATION AREA	EXPERTISE
BIOMEDICAL TECHNOLOGY AND HUMAN FACTORS ENGINEERING	
Prosthetics and Mechanical Organs	Develop material to be used as replacements for tendons, bone segments, arteries, veins.
ENVIRONMENTAL POLLUTION AND CONTROL	
Environmental Health And Safety	Establish environmental quality standards for Army-unique contaminants to protect human health; develop effective methods for identification, measurement, control and elimination of contaminants in air and waste water effluents.
MEDICINE AND BIOLOGY	
Dentistry	Increase understanding of the causes of oral disease; develop improved dental materials and equipment.
Hematology	Improve the effectiveness of whole blood and blood components and plasma substitutes in blood replacement.
Public Health and Industrial Medicine	Research in the control of malaria, arthropod-borne virus diseases, diarrhea, hepatitis and acute respiratory diseases.

CONTACT:
Mr. Lawrence Ware
Fort Detrich-Bldg. 521
Frederick, MD 21701
Telephone: (301) 663-7325
Autovon: 343-7325

US ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND
Dover, NJ 07801

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Computer Application	Systems analysis, data base management, business-type programming.
Management Information	Mathematical analysis, management information systems.
Management Practice	Corporate planning, programming and budgeting; technical program management, analysis and control; program evaluation.
Research Program Administration and Technology Transfer	Armament concepts, systems evaluation, programs management, personnel and force development, management information systems, procurement procedures.
General	Value engineering, operations research.
CHEMISTRY	
General	Inorganic, organic, physical, analytical and biological. Environmental technology, CB detection and alarm systems. Experimental and test evaluation, safety and health physics, test facilities.
COMPUTERS, CONTROL AND INFORMATION THEORY	
Computer Hardware	Large scale, mine, and micro; digital and analog; remote terminals; batch, teletype and graphics; interactive graphics.
Computer Software	Scientific and engineering applications, business-type applications, operating systems, weapons control.

APPLICATION AREA	EXPERTISE
Control Systems and Control Theory	Information storage and retrieval.
ENVIRONMENTAL POLLUTION AND CONTROL	
Water Pollution Control	Techniques for monitoring and removing organic nitrocompounds, nitramines, nitrate esters, sulfites and mineral acids occurring in manufacturing plant waste streams.
MATERIALS SCIENCES	
Adhesives and Sealants	Adhesive technology.
Plastics	Plastics technology.
General	Metallurgy technology.
MATHEMATICAL SCIENCES	
General	Statistics, simulation, modeling, analysis, linear and non-linear computer programming.
MEDICINE AND BIOLOGY	
General	Chemical/biological agents; ecology; biology, biochemistry; pollution monitoring; environmental assessments; demilitarization; human factors.
ORDNANCE	
Ammunition, Explosives and Pyrotechnics	Explosive ordnance disposal, aeroballistics, gun propulsion, energetic materials, manufacturing technology, systems and modeling, fuze technology, nuclear and non-nuclear applications in ordnance.
Detonations, Explosion Effects and Ballistics	Vulnerability and lethality, ballistic modeling, propulsion, launch and flight dynamics; terminal effects, warhead mechanics, value engineering, test facilities.

APPLICATION AREA	EXPERTISE
Fire Control and Bombing Systems	Applied science; energetic materials and manufacturing technologies; systems development modeling; fire control systems, simulation and analysis; test facilities.
PHYSICS	
Solid State Physics	Optical absorption, X-ray photoelectron spectroscopy, scanning electron microscopy, electron spin resonance, laser Raman spectroscopy applied to energetic materials, metals, plastics and adhesives.
General	Mechanical properties, deflagration/detonation phenomena, friction and electrostatic testing, lasers. Measurement of electromagnetic field effects - RF, lightning, static charge - and methods for protection from these fields. Classical, solid state, laser, semiconductor.
PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS	
Forensics (Explosives)	Detection and identification of explosives; handling and chemical and metallurgical examination of post-explosion debris.

CONTACT: T. C. Castorina
US Army Armament Research and
Development Command
Energetic Materials Division
Dover, NJ 07801
Telephone (201) 328-2560
Autovon 880-2560

BOISE INTERAGENCY FIRE CENTER
Boise, Idaho 83705

APPLICATION AREA	EXPERTISE
AERONAUTICS AND AERODYNAMICS	
Aircraft	Aircraft for surveillance and mapping terrain and wildland fires. Aircraft for tactical fire control.
Avionics	Special purpose navigation, direction finder, and communications equipment.
ATMOSPHERIC SCIENCES	
Dynamic Meteorology	Application of meteorology to the dynamics of fire weather behavior.
Meteorological Data Collection, Analysis and Weather Forecasting	Collection, processing, and transmismision of meteorological data from remote sites by satellite relay and telemetry. Area, local, and fire weather forecasting.
Meteorological Instruments and Instrument Platforms	Instruments for measuring meteorological parameters in conjunction with remote stations.
COMMUNICATIONS	
Radio and Television Equipment	Mobile and personal portable radios, repeaters, antennas. Airborne telemetry, radio, TV, and image transmission links.
DETECTION AND COUNTERMEASURES	
Infrared and Ultraviolet Detection	Airborne infrared line scanners; terrain and fire detection and mapping; image processing and display; FLIR; portable IR detection equipment.
Lightning Detection	Detection and location identification of cloud-to-ground lightning strikes.

APPLICATION AREA	EXPERTISE
NATURAL RESOURCES AND EARTH SCIENCES	
Forestry	Forest and wildland fire management, control, and suppression. Infrared surveillance. Field communication systems.
PROBLEM SOLVING FOR STATE AND LOCAL GOVERNMENTS	
Police, Fire, and Emergency Services	Complete field communications systems, air transportable to any location. Fire and emergency, logistics, supplies, and management support.
TRANSPORTATION	
Air Transportation	Air transportation of personnel, equipment and supplies for fire and emergency operations.

CONTACT:
John R. Warren
Electronic Engineer
USDA-Forest Service
Boise Interagency Fire Center
3905 Vista Avenue
Boise, Idaho 83705
Telephone: (208) 384-1439
FTS: 554-1439

BROOKHAVEN NATIONAL LABORATORY
Upton, New York 11973

APPLICATION AREA	EXPERTISE
PHYSICS	
High Energy Physics	Theory. Operation of 33 Bev synchiotics. Hadron spectroscopy. Neatrine interactions. Vetra high vacuum technology. Cryogenics. Electromagnet design. Superconducting 60 Hz power transmission. Advanced proton accelerator design.
Low Energy Physics	Theory. Operation of 13 MV Tandem Van de Graaff accelerator.
Solid State Physics	Theory. Use of 40 MV uranium-fueled, heavy water moderated reactor. Neutron probe studies of inorganic, organic, and biological structures. Organic conductors.
CHEMISTRY	Solar neutrine experiments. Nuclear chemistry: reactions and spectroscopy. Critical point phenomena in changes of state. Structural chemistry using neutron probes. Theory. Transient ions and free radicals. Inorganic solution kinetics and photochemistry. Laser separation of isotopes. Gaseous ion chemistry. Medical radioisotopes. Analysis for environmental pollutants.
BIOLOGY	Structural analysis by neutron scattering. Scanning transmission electron microscopy. Fluorescence electron microscopy. Plant genetics and cell biology. Molecular genetics. Photosynthesis.
MEDICINE	Nuclear medicine - diagnostic imaging techniques and radiation treatment. Effects of air pollutants - ozone and NOX. Radiation induced carcinogenesis. Hypertension.

APPLICATION AREA	EXPERTISE
ENVIRONMENTAL POLLUTION AND CONTROL	
Radiation Pollution and Control	Special competence in radiation-related environmental monitoring, including long-term effects of fall-out effects on human populations. CONTACT: W. L. Graves Brookhaven National Laboratory Bldg 460 Upton, New York 11973 Telephone: (516) 345-3326 FTS: 664-3326

AIR FORCE CIVIL ENGINEERING CENTER
Tyndall Air Force Base, Florida 32403

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Research Program Administration and Technology Transfer	Program planning, development, execution and management. Contract management. Technology transfer program.
BUILDING INDUSTRY TECHNOLOGY	
Construction Management Techniques	Value engineering, network planning, construction management.
Structural Analysis	Hardened aircraft shelters and related facilities.
Building Standards and Codes	Air Force design criteria and fire protection standards.
Construction Materials, Components and Equipment	Aircraft shelters, mobility shelters, community support facilities, housing, mission support facilities.
CIVIL ENGINEERING	
Civil Engineering	Airfield design and maintenance, sewer plants, water treatment, materials testing.
Construction Equipment, Materials and Supplies	Earthmoving, paving, roads and airfields.
Soil and Rock Mechanics	Soil stabilization, airfield pavement evaluations.
ENERGY	
Solar Energy	Solar assisted heat pumps, solar heating and cooling, solar cathodic protection.

APPLICATION AREA	EXPERTISE
Miscellaneous Energy Conversion and Storage	Wind generators and conversion, alternate energy for remote sites, solar assisted heat for homes.
General	Energy conservation techniques. Energy monitoring and control systems.
ENVIRONMENTAL POLLUTION AND CONTROL	
Air Pollution and Control	Air quality assessment model, aircraft engine emissions.
Noise Pollution and Control	Noise exposure forecasting for airfields.
Solid Wastes Pollution and Control	Optimum routing, recycling, resource recovery.
Water Pollution and Control	Electroplating wastes, industrial wastes; photo wastes. Water quality assessment model.
Environmental Impact Assessments	Socio-economic, legal, biological, terrestrial, air and water, land use, planning.
INDUSTRIAL AND MECHANICAL ENGINEERING	
Nondestructive Testing	Airfield pavement evaluations, delaminations and water in foam beam, honeycomb aluminum panels.
NATURAL RESOURCES AND EARTH SCIENCES	
Natural Resource Management	Bird/aircraft strike hazards. Management plans for Air Force installations.
Forestry	Management plans for Air Force installations.

APPLICATION AREA	EXPERTISE
PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS	
Police, Fire and Emergency Services	Structural and crash rescue fire equipment, systems and techniques.
Energy	Energy conservation and monitoring and control systems.
Environment	Environmental impact assessments, pollution abatement systems, solid waste routing.
URBAN AND REGIONAL TECHNOLOGY AND DEVELOPMENT	
Environmental Management and Planning	Environmental planning, regional recycle and resource recovery.

CONTACT: Robert E. Brandon
Technical Director
Tyndall AFB, Florida 32403
Telephone: (904) 283-6200
Autovon: 970-6200

AIR FORCE CIVIL AND ENVIRONMENTAL ENGINEERING DEVELOPMENT OFFICE

Tyndall AFB, Florida 32403

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Research Program Administration and Technology Transfer	Program planning, development, execution and management, contract management. Technology Transfer program.
CHEMISTRY	
Analytical Chemistry	Aqueous chemistry, atmospheric photochemistry, pollutant transport mechanisms, advanced pollutant monitoring technique development.
CIVIL ENGINEERING	
Civil Engineering	Airfield design and maintenance, water and wastewater treatment.
Construction Equipment, Materials and Supplies	Paving, road and air field materials.
Soil and Rock Mechanics	Soil stabilization, airfield pavement evaluations.
ENERGY	
Fuels	Conversion of solid waste to energy.
Solar Energy	Solar-assisted heat pumps, solar heating, solar cathodic protection.
Miscellaneous Energy Conversion and Storage	Wind generators and conversion, alternate energy for remote sites, solar-assisted heat for homes, waste heat recovery.
General	Energy conservation techniques, energy monitoring and control systems.
Environmental Studies	Environmental chemistry of alternate fuels.

APPLICATION AREA	EXPERTISE
ENVIRONMENTAL POLLUTION AND CONTROL	
Air Pollution and Control	Air quality assessment modeling, aircraft engine emission measurements.
Solid Wastes Pollution and Control	Optimum routing, recycling, resource recovery.
Water Pollution and Control	Electroplating wastes, industrial wastes, photo waste, water quality assessment modeling, cascade water reuse, pollutant identification.
Environmental Impact Statements	Environmental engineering.
INDUSTRIAL AND MECHANICAL ENGINEERING	
Nondestructive Testing	Airfield pavement evaluations, ultrasonic evaluation of delaminations and water in foam beam, and honeycomb aluminum panels.
MATERIALS SCIENCES	
Corrosion and Corrosion Inhibition	Cathodic protection, protective coatings.
NATURAL RESOURCES AND EARTH SCIENCES	
Natural Resource Management	Conservation and management plans for Air Force bases and ranges.
Forestry	Management plans for Air Force installations.
PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS	
Economic and Community Development	Comprehensive planning.

APPLICATION AREA	EXPERTISE
Police, Fire and Emergency Services	Structural and crash rescue fire equipment, systems and techniques. Advanced fire fighting agents, pollution control fire fighting agents.
Energy	Energy conservation, monitoring and control systems, conversion of solid waste to energy.
Environment	Environmental impact assessments, pollution abatement systems, land use planning.
TRANSPORTATION	
Air Transportation	Evaluation of airfield pavement roughness. Evaluation of skid resistance characteristics of airfield pavements techniques to improve skid resistance, warm fog dispersal.
URBAN AND REGIONAL TECHNOLOGY AND DEVELOPMENT	
Environmental Management and Planning	Environmental planning, pollution emission modeling, waste recycle and resource recovery.
Transportation and Traffic Planning	Comprehensive planning.

CONTACT:
COL Joseph S. Pizzuto
Det 1. (CEEDD)ADTC
Tyndall AFB, Florida 32403
Telephone: (904) 283-5287
Autovon: 970-5287

CIVIL ENGINEERING LABORATORY
NAVAL CONSTRUCTION BATTALION CENTER
Port Hueneme, California 93043

APPLICATION AREA	EXPERTISE
BUILDING INDUSTRY TECHNOLOGY	
Structural Analyses	Moored, suspended or fixed seafloor structures. Soil liquefaction effects on structures following earthquakes.
Construction Materials, Components, and Equipment	Use of concrete and acrylic plastic in the sea.
CIVIL ENGINEERING	
Civil Engineering	Sanitary engineering, soil stabilization, water pollution and control, soil and rock mechanics, solid waste pollution and control. Structural mechanics, material properties, and load carrying capacity of rigid and flexible airfield pavements.
Construction Equipment, Materials and Supplies	Automatic leveling controls for excavation and earth moving equipment.
Earthquake Design	Techniques for rapid determination of earthquake vulnerability of buildings. Predicting and mitigating potential damage effects to structures of seismically induced soil liquefaction.
Soil and Rock Mechanics	Physical properties of soil and rock for engineered construction.
ELECTROTECHNOLOGY	
Power and Signal Transmission Devices	Developed a device to detect and monitor fluctuations in the power supply to sensitive apparatus such as communications equipment and

APPLICATION AREA	EXPERTISE
Power and Signal Transmission Devices (contd)	computers. An electrical transient direction detector was also developed that identifies whether the disturbance is caused by the power source or the load.
ENERGY	
Heating and Cooling Systems	Investigation of alternate systems to determine suitability for applications.
Fuels	Investigation of combustion characteristics and suitability of various fuels for use in the boilers and heating plants.
Solar Energy	Investigation of alternate energy systems to determine economics and suitability for applications.
Miscellaneous Energy Conversion and Storage	Investigation of alternative techniques to fulfill energy requirements.
ENVIRONMENTAL POLLUTION AND CONTROL	
Air Pollution and Control	Instrumentation and control procedures for emissions from boilers/engine test cells.
Ecological Assessment	Methods/techniques for ecological inventory, monitoring and evaluation of terrestrial, wet land and aquatic ecosystems.
Noise Pollution and Control	Materials and analysis techniques for noise control equipment by high sound pressure/temperature.
Solid Wastes Pollution and Control	Equipment, techniques for recovery/reuse/disposal of solid waste.
Water Pollution and Control	Improved methods of treating oil spills.

APPLICATION AREA	EXPERTISE
Water Pollution and Control (contd).	Standards/processes for treatment for reuse and disposal of wastewater oil spill recovery systems and oil/water separator technology. Systems, hardware and instrumentation for dredge spoil reduction by prevention of deposition around Navy piers. Toxic substance detoxification/handling and land decontamination procedures. Process and process control technology for heavy metal wastes contaminated with sea water.
GOVERNMENT INVENTIONS FOR LICENSING	
Mechanical Devices and Equipment.	Propellant driven anchors.
Electrotechnology.	A device to detect and monitor fluctuations in power supplies. An electrical transient direction detector.
Instruments.	Undersea diver tools.
INDUSTRY AND MECHANICAL ENGINEERING	
Hydraulic and Pneumatic Equipment.	Buoyancy Transport Vehicle. Construction Assistance Vehicle. Diver tools and work systems, ocean cable burial and nearshore trenching, deep ocean pontoon recovery and salvage systems. Hydraulic fluidic sensor. Fluidic mixing device. Fluidic oil/water separator.

APPLICATION AREA	EXPERTISE
MATERIALS SCIENCES	
Adhesives and Sealants	Underwater-curing adhesives, and characterization of such materials for construction.
Coatings, Colorants, and Finishes	Characterization of such materials for construction, with emphasis on marine and marine atmospheric environments.
Corrosion and Corrosion Inhibition	Metal selection for specific end uses, particularly in marine environments, and protective systems for structures exposed to corrosion.
Materials Degradation and Fouling	Inspection, repair and maintenance of shore-based facilities; anti-fouling paint and concrete.
Plastics	Properties and characteristics related to specific application requirements, e.g., underpier and other piping and utilities, sidings, roofing insulation.
NATURAL RESOURCES AND EARTH SCIENCES	
Snow, Ice and Permafrost	Cold-weather Polar region RDT&E and engineering using in-house developed computer programs, and numerical analytical techniques for solving snow, ice, permafrost and habitation problems. This includes (1) snow handling and processing techniques; (2) analyzing physical and mechanical properties of ice; (3) thermodynamic analysis techniques for predicting heat flux migration in permafrost and ice; and (4) facility and utility system design.

APPLICATION AREA	EXPERTISE
NUCLEAR SCIENCE AND TECHNOLOGY	
Nuclear Explosions and Devices	Study the damage effects of nuclear explosions operation underwater and above and below ground.
	Design hardened air entrainment systems.
	Development of blast closure valves.
	Development of air blast wave attenuators.
	Study alternate power systems for hardened structures.
	Design environmental control systems for hardened structures.
OCEAN TECHNOLOGY AND ENGINEERING	
Physical and Chemical Oceanography	Oil spills.
Marine Geophysics and Geology	Use of acoustics to determine geological and geotechnical aspects of seafloor.
Oceanographic Vessels, Instruments, and Platforms	Current measurement systems. Buoyancy Transport Vehicle that performs functions of a seagoing forklift.
	Construction Assistance Vehicle--a diver-operated pickup truck.
Underwater Construction and Habitats	Concrete habitats, acrylic plastic habitats, moorings, cable arrays, load handling systems, diver tools, anchors, underwater mateable electrical connectors, power transmission, distribution and control systems, seafloor excavation and trenching, ocean cable protection.

APPLICATION AREA	EXPERTISE
Underwater Construction and Habitats (contd)	Design, analysis, construction, and emplantment of structures on, in, or suspended from the sea-floor, e.g., moorings, cable arrays, breakwaters, concrete structures. Acrylic plastic and concrete for use in the ocean. Propellant driven anchors; pontoon lift systems for salvage work; diver heating systems; and undersea diver tools. Geotechnical investigations. Determination of sea-floor and terrestrial geotechnical properties. Sea-floor penetration and breakout. Anchor holding capacity. Sea-floor foundation design.
ORDNANCE	
Detonation, Explosion Effects and Ballistics	Test and evaluation. Dynamic structural response due to impact loading from blast.
PHYSICS	
Structural Mechanics	Dynamics and statics of solid bodies, kinetics, shock and vibration, stress analysis (experimental and theoretical).

CONTACT: Eugene H. Early
Code L03C
Civil Engineering Laboratory
Port Hueneme, California 93043
Telephone: (805) 982-4070
Autovon: 360-4070

CONSTRUCTION ENGINEERING RESEARCH LABORATORY
Champaign, Illinois 61820

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Inventory Control	Inventory Control system, Stock level control methods, warehouse automation.
Management Practice	Procurement management system, cost analysis, management analysis, effectiveness evaluation of laboratory performance.
Management Information Systems	Zero base budgeting, equipment management.
Research Program Adminstration Technology Transfer	Resource data base development, technology transfer program.
BEHAVIOR AND SOCIETY	
Psychology	Environmental reaction and personnel interactions; job satisfaction; human behavior; adjustment, attitudes; intelligence; judgment, leadership, and motivation; personality, psychology and psychometrics.
BUILDING INDUSTRY TECHNOLOGY	
Architectural Design/ Environmental Engineering	Planning and building program, including functional relationships and building types; market analysis and cost factors; building program; product development and improvement; design methods and problem solving techniques; user needs, user preferences and post-construction evaluation studies; site selection and considerations; aesthetics; ecological factors and sociological, psychological and physiological considerations.

APPLICATION AREA	EXPERTISE
Construction Management and Techniques	Construction management; the process of organizing, planning and controlling the fabrication, delivery and erection operations for building, using mathematical programming and simulation to predict sequences; collection of all data related to such operations and progress accounting; network planning; cost-benefit analyses; decision making; management systems (PPB etc.); labor-management relations; man-power studies; record keeping; adverse weather practice; logistics planning; simplified critical path systems for on-site construction planning and control; training for construction management; site prefabrication.
Building Standards and Codes	U.S. Corps of Engineers guide specifications in selected fields in building construction.
Construction Materials Components and Equipment	Includes insulation, moisture-proofing, caulking and sealants, furnishings, swimming pools, etc.; improved use of indigenous materials, simple roofing systems; soil comments, rammed earth, brick and tile; basic water supply and waste systems; plastics; structural members, etc.
Building Equipment, Furnishing and Maintenance	All mechanical systems, power systems, interior designs and decors, and full range of maintenance activities and management.

CIVIL ENGINEERING

Highway Engineering	Construction of roads and highways; highway and rights-of-way maintenance, bridges and bridge systems.

APPLICATION AREA	EXPERTISE
Civil Engineering	Highway design, sanitary engineering, water supplies, water pollution and control.
Construction Equipment Materials and supplies	Concrete and cement.
COMPUTERS, CONTROL AND INFORMATION THEORY	
Computer Hardware	Design and development of minicomputers.
Computer Software	Computer programming, programming languages, large-scale systems of computer applications.
Information Processing Standards	Standards to provide for economic and effective use of automated data processing equipment and systems.
DETECTION AND COUNTERMEASURES	
Acoustic Detection	Detection by means of sound waves including ultrasonic detection.
ENERGY	
Energy Use Supply and Demand	Energy consumption and capacity, supply and demand projections, technological advances and impacts on the industry.
Energy Transmission/Electric Power Transmission	Electric power distribution, electric power tools from a wireless energy transmission, new technology and trends.
Fuel Conversion Processes	Physical and chemical methods of converting fuels to increase their availability by improving handling, storage or use limited to coal liquification and gasification.
Solar Energy	Design of economic life-cycle cost solar energy heating and cooling system.

APPLICATION AREA	EXPERTISE
Environmental Studies	Impact of energy conversion on the environment.
General	Economical design of waste derived fuels.

ENVIRONMENTAL POLLUTION AND CONTROL

Air Pollution and Control	Air pollution from flu gases; control techniques and equipment; sampling and analytical techniques and equipment; waste gas recovery.
Noise Pollution and Control	Pollution in the environment by noise from any source including engine noise, traffic and transportation noise, industrial noise, urban noise, sonic boom.
Solid Waste Pollution and Control	Pollution by solid waste including garbage; disposal such as incineration, sanitary landfills; recycling; biological and ecological effects; disposal of concentrated or pure liquids; disposal of pesticides.
Water Pollution and Control	Pollution by municipal waste, industrial waste; chemistry analysis of pollutants; water pollution; control of techniques and equipment; sewage treatment.
Environmental Impact Statements	Development of environmental impact of all operations in construction, maintenance, and operations in a small community as represented by a military installation.

INDUSTRIAL AND MECHANICAL ENGINEERING

Production Planning and Process Controls	Sampling techniques, modeling techniques and programs controls; operational information.

APPLICATION AREA	EXPERTISE
Plant Design and Maintenance	Workshops and feasibility studies such as site selection, layout of utilities.
Environmental Engineering	Design modification and maintenance of equipment and controls of job location.
Nondestructive Testing	Ultrasonic testing, radiographic testing, and miscellaneous testing.
MATERIAL SCIENCES	
Ceramic Refractories and Glass	Ceramic materials including non-metallic refractory materials.
Coatings, Colorants and Finishes	Paints, primers, plastics and rubber coatings, ceramic coatings, etc.
Composite Materials	Reinforced plastics, carbonographic composites, laminates, metal matrix composites.
Corrosion and Corrosion Inhibition	Corrosion of metals and corrosion inhibition; metal corrosion inhibitors; rusting.
Iron and Iron Alloys	Microstructure, physical and mechanical properties; phase studies.
Materials Degradation and Fouling	Aging, erosion, wear, weathering, deterioration, decay; biodeterioration; rusting and embrittlement.
Nonferrous Metals and Alloys	Microstructure, physical properties, mechanical properties; phase studies.
Plastics	Physical and mechanical properties performance and production; includes plastic additives such as plasticizers, stabilizers, fillers, curing agents, etc., filler plastics.

APPLICATION AREA	EXPERTISE
MATHEMATICAL SCIENCES	
Operations Research	Game theory, cueing theory; management games, mathematical models; mathematical programming, network flow; search theory.
Statistical Analysis	Analysis of variance; discriminate analysis; statistical analysis, factual analysis; nonfarametric statistics; regression analysis; statistical decision theory; statistical distribution, statistical inference; statistical quality controls; statistical tests.
NATURAL RESOURCES SURVEYS	
Use of Scientific Satellite ERTS	Aerial photography.
PHYSICS	
Acoustics	Generation and transmission of sound through various media or enclosures.
Structural Mechanics	Dynamics and statics of solid bodies; kinematics, kinetics, shock and vibration, stress analysis.
URBAN AND REGIONAL TECHNOLOGY AND DEVELOPMENT	
Environmental Management and Planning	Air, water, noise and waste management and control; monitoring services, solid waste and recycling; solid waste landfills; water quality management; environmental surveys, design and operation of sewer systems; water supplies and services management.
Housing Planning and Construction	Surveys and assessments of existing housing, planning and construction; enclosure systems for human activity interest; housing renovation.

APPLICATION AREA	EXPERTISE
Economic Planning.	Economic analyses; population-economy-income studies; quality of life.

CONTACT:
Robert M. Dinnat
Associate Technical Director
USACERL
P.O. Box 4005
Champaign, IL 61820
Telephone: (217) 352-6511

CGRDC
(Northeast Region)

COAST GUARD RESEARCH AND DEVELOPMENT CENTER
Avery Point, Groton, Connecticut 06340

APPLICATION AREA	EXPERTISE
ENVIRONMENTAL POLLUTION TECHNOLOGY	
Marine Pollution Technology . . .	Oil identification. Hazardous substance identification and quantification. Oil pollution trajectory forecasting. Oil pollution trajectory hindcasting. Spill prevention equipment (damage control). Spill containment devices. Hazardous chemical damage control and containment.
NAVIGATION, GUIDANCE AND CONTROL	
Marine Navigation Technology. . .	Aids to navigation. Solar power. Precision electronic navigation systems.
OCEAN TECHNOLOGY AND ENGINEERING	
Domestic and Polar Ice Technology.	Ice theory as it applies to characterization of ice occurring in navigable waters. Field testing supporting polar and domestic icebreakers. Iceberg technology including, size, distribution and deterioration. Physical oceanography relating to drift characteristics of ice. Ice physics. Cold region equipment.
Marine Fire and Safety Research.	Full scale ship fire testing. Boating safety. Examination of technology of equipment, application and physical/chemical processes of fires and fire fighting. System safety analysis as it applies to marine fire and recreational boating (RB) processes. Theoretical naval architecture, addressing RB problems. Automated data collection/processing and associated instrumentation.

APPLICATION AREA	EXPERTISE
Search and Rescue Technology. .	Search and rescue equipment development. Rescue equipment technology, rescue techniques and search effectiveness. Application of operations research and modeling techniques for improved planning and resource allocation.
TRANSPORTATION	
Marine Traffic Management . . .	Vessel traffic management software. Microprocessor development. Computer assisted radar vessel tracking. Modularized computer display and processing techniques. Vessel traffic data acquisition systems.

CONTACT: D. L. Birkimer
Coast Guard Research and Development
Center
Avery Point, Groton, CT 06340
Telephone: (203) 445-8501

CSL
(Mid-Atlantic Region)

CHEMICAL SYSTEMS LABORATORY
Aberdeen Proving Ground, Maryland 21010

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Research Program Administration and Technology Transition	Experience in administration of multidisciplinary basic and applied research programs in the physical sciences.
AERONAUTICS AND AERODYNAMICS	
Aeroballistics	Liquid filled projectiles.
ATMOSPHERIC SCIENCE	
Monitoring	Instrumentation for monitoring atmospheric pollutants. Plant monitors, field monitors (automatic/portable). Devices to detect subhazardous concentrations of toxic materials in air, water, or on surfaces.
BIOMEDICAL TECHNOLOGY AND HUMAN FACTORS ENGINEERING	
Life Support Systems	Individual and collective protection against chemical and biological aerosols.
CHEMISTRY	
Analytical Chemistry	Broad capability in detection, identification, and analysis of compounds using a variety of modern techniques including gas chromatography, mass spectrometry (GC and ionic cluster), microanalysis, electron microscopy, atomic absorption, infrared, and Raman (Lasar) analyses.
Basic and Synthetic Chemistry	Synthesis of full range of organic compounds, and reactions of chemical compounds with human chemistry.

APPLICATION AREA	EXPERTISE
Industrial Chemistry and Chemical Process Engineering	Pilot plants and process technology.
Physical and Theoretical Chemistry	Physical property data, reaction kinetics, and thermodynamics.
General	Broad capability in basic and applied research.
COMPUTERS, CONTROL, AND INFORMATION THEORY	
Computer Software	Preparation of computer programs to predict aerodynamic stability of liquid filled projectiles.
Pattern Recognition and Image Processing	Use of chemometrics in reduction of chemical data and correlation of chemical structures to pharmalogical activity. Use of pattern recognition techniques to predict recovery or non-recovery of shock-trauma patients.
DETECTION AND COUNTERMEASURES	
Electromagnetic and Acoustic Countermeasures	Smokes and aerosols.
ENERGY	
Fuel Conversion Processes	Coal gasification.
ENVIRONMENTAL POLLUTION AND CONTROL	
Air Pollution and Control	Real time air pollutant monitoring and sampling techniques.
Environmental Impact Statement	Preparation, review, and evaluation.

APPLICATION AREA	EXPERTISE
Pesticides Pollution and Control	Water testing kits, decontamination and destruction.
Solid Wastes Pollution and Control	Decontamination and removal of hazardous materials.
Water Pollution and Control	Manufacturing residues from chemical plants, detection of residual contaminants, and sampling techniques.
General	Broad capability to perform research. Environmental surveys, pollution detection and monitoring, chemical treatment technology.
HEALTH PLANNING	
Health Care Technology	Use of pattern recognition techniques to predict recovery of shock-trauma patients.
LIBRARY AND INFORMATION SCIENCE	
Information Systems	Retrieval of information on toxicological properties of chemical compounds, and chemical properties.
MATERIALS SCIENCES	
General	Basic and applied research capability.
MATHEMATICAL SCIENCES	
Statistical Analysis	Handling of data and design of experiments; univariate and multivariate statistical analysis; designed experiments; feasibility studies; hazard analysis; model building.
Systems Analysis	Comparative cost effectiveness studies; threat analysis; simulation.

APPLICATION AREA	EXPERTISE
MEDICINE AND BIOLOGY	
Botany	Effects of pollutants on vegetation.
Clinical Medicine	Treatment methods for poisoning by fluorine-phosphorous compounds.
Ecology	Effects of pollutants of fauna, flora, etc.
Pharmacology and Pharmacological Chemistry	Treatment of poisoning by anti-cholinesterase compounds.
Psychology	Decrement of performance evaluations of prophylactic and therapeutic drugs.
Toxicology	Data bank on any known toxic compound.
ORDNANCE	
Ammunition, Explosives and Pyrotechnics	Riot control agents and dispersers. Noise, light, smoke and heat generators; ordnance simulators.
Armor	Lightweight bullet-proof garments.
PHYSICS	
General	Research on aerosols, air filtration, air sampling.

CONTACT: W. A. Barr
Attention: DRDAR-CLR-L
Chemical Systems Laboratory
Aberdeen Proving Ground, MD 21010
Telephone: (301) 671-2031
Autovon: 584-2031

ENVIRONMENTAL RESEARCH LABORATORY, NARRAGANSETT
South Ferry Road, Narragansett, Rhode Island 02882

APPLICATION AREA	EXPERTISE
CHEMISTRY	
Analytical Chemistry	Analysis of pollutants in marine waters, sediments and organisms.
ENERGY	
Geothermal Energy	Measurement of biological effects of introduction of thermal effluents - chemical and physical impact of one-through cooling.
ENVIRONMENTAL POLLUTION AND CONTROL	
Water Pollution and Control	Standardized measurement of effects of pollutants on marine organisms and ecosystems using both lethal and sublethal indicators - particularly oils and metals. Computerized analysis of motion of particles or organisms in water. Use of chemical, physical, and biological techniques to measure pollutant buildup, translocation, and transformation.

CONTACT: Dr. Stanley H. Hergre
Environmental Protection Agency
Environmental Research Laboratory
South Ferry Road
Narragansett, Rhode Island 02880
Telephone: (401) 789-1071

ETL
(Mid-Atlantic Region)

U.S. ARMY ENGINEER TOPOGRAPHIC LABORATORIES
Fort Belvoir, Virginia 22060

APPLICATION AREA	EXPERTISE
ASTRONOMY AND ASTROPHYSICS	
Astronomy and Celestial Mechanics	Modification of astrogeodetic (wild T4) and other sensors. Orbit computations (short and long arc determinations). Geometric and dynamic position determination. Recovery of gravitational field.
CHEMISTRY	
Photo and Radiation Chemistry	Laboratory facility and expertise to test all types of photo emulsions, includes evaluation.
CIVIL ENGINEERING	
General	Use of interdisciplinary photo-interpretation for urban planning, land-use, construction sites. Soils and rock mechanics and their relationship to military planning and operation.
COMPUTER, CONTROL AND INFORMATION THEORY	
Computer Hardware	General purpose scientific computers. Mini computers as controllers. Parallel processors.
Computer Software	Digitized terrain models. Image simulation. Cartographic data manipulation and symbolization.
Pattern Recognition and Image Processing	Interactive pattern recognition which relies on human intervention. Search operations by sampling. Dynamic range compression and expansion. Stereo presentation by anaglyph. Image mensuration. Pseudo color analysis and presentation.

APPLICATION AREA	EXPERTISE
DETECTION AND COUNTERMEASURES	
Optical Detection	On a limited basis, coherent optical analysis using the power spectrum of photo images can be used to detect special objects and vehicles.
ELECTROTECHNOLOGY	
Optoelectronic Devices and Systems	Pockels Read-only Modulator (PROM) device used as a spatial light modulator for image processing and pattern recognition. Acousto-optical device for the acoustic modulation of crystals for scanning with laser beams. Sensing arrays as a sampling sensor within a scanner. Hybrid optical-digital system for pattern recognition. Optical sampling and digital classification. Devices for cartographic data and terrain elevation extraction from photography. Exploitation of Charge Couple Devices. Optical Fast Fourier Transform (DEFT).
MATHEMATICAL SCIENCE	
General	All aspects of mathematics except operations research are used for research in the topographic and geographic sciences. Array algebra as a subset of matrix theory. Finite elements to replace finite difference approach to numerical solution of differential equations. Correlation algorithm divided into concurrent elements for parallel processing. Mathematical terrain modeling using weighting function interpolation.
MEDICINE AND BIOLOGY	
Botany	Correlations of vegetation with soil type and soil depth from aerial imagery.

APPLICATION AREA	EXPERTISE
NATURAL RESOURCES AND EARTH SCIENCES	
Cartography	Topography map design and test methodology. Map symbolization and type placement. Semiautomated cartography including hardware and software to expedite the cartographic and map revision processes.
General	Studies depicting inventories of natural and cultural resources of selected military bases. Aspects of earth sciences as they relate to military planning and operations. Specific elements are: Cross country mobility, cover and concealment, lines of communication and fields of fire.
NAVIGATION, GUIDANCE AND CONTROL	
Navigation and Guidance System Components	Analog and digital reference scenes for aircraft or missile en route. Navigation and/or terminal guidance correlation systems. Simulation of radar and radiometric terrain images for guidance systems using correlation techniques.
Navigation Systems	Inertial technology for vehicular position and azimuth determination. Ground experiments on foliage penetration and multi-path aspects of the global positioning system. Adaptation of inertial technology to determine gravity anomalies and deflections of the vertical.
PHOTOGRAPHY AND RECORDING DEVICES	
Holography	Holographic techniques for image mensuration. Holographic multiple-image storage. Holographic filters for pattern recognition.

APPLICATION AREA	EXPERTISE
Recording Devices	Real-time optical modulators (PROM). Photographic materials for holography. Optical-digital storage mediums and devices.
Photographic Techniques and Equipment	Development of continuous surface imaging devices. Photographic image quality analysis.

CONTACT: Dr. Kenneth R. Kothe
U.S. Army Engineer Topographic Laboratories
Fort Belvoir, Virginia 22060
Telephone: (703) 664-5828
Autovon: 354-5828

FBI LABORATORY
Washington, D.C.

APPLICATION AREA	EXPERTISE
CHEMISTRY	
Analytical Chemistry	Chemical examinations of materials of evidentiary nature in criminal matters.
MATERIALS SCIENCES	
Fibers and Textiles	Microscopic comparisons/examinations of hairs/fibers/fabrics of evidentiary nature in criminal matters.
General	Examinations/comparisons of general categories of materials of evidentiary nature in criminal matters such as soils, glass, metals, drugs, plastics, petroleum products, chemicals, dyes/inks, gun powder residues, bombs, blood/tissue, hairs, fibers, fabrics, toolmarks, tools, guns, ammunition, explosives, poisons, fuels, typewriting, handwriting, photographs, plaster casts.
MEDICINE AND BIOLOGY	
Immunology	Determination of origin of body fluids.
PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS	
Police	Forensic science research and development.
URBAN AND REGIONAL TECHNOLOGY AND DEVELOPMENT	
Law Enforcement	Specialized instruction/courses in forensic science for local law enforcement crime laboratory scientists.

CONTACT:
Dr. C. G. McWright
Federal Bureau of Investigation
Department of Justice, FBI Laboratory
9th and Pennsylvania Avenue, N.W.
Washington, D.C. 20535
Telephone: (202) 324-4420

U.S. FOREST SERVICE
Forest Fire Laboratory
4955 Canyon Crest Drive Post Office Box 5007
Riverside, California 92507

APPLICATION AREA	EXPERTISE
ATMOSPHERIC SCIENCES	
Meteorological Data Collection, Analysis, and Weather Forecasting	Collection, processing and transmission of meteorological data from remote sites by satellite relay and telemetering.
Meteorological Instruments and Instrument Platforms	Instruments for measuring meteorological parameters in conjunction with remote stations.
NATURAL RESOURCES	
Forestry	Forestry, range, atmospheric, and forest fire research.
PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS	
Police, Fire, and Emergency Services	Wildland fire protection planning; development of multi-agency coordination systems; application of systems technology to wildland fire management problems.

CONTACT: Mr. Richard Chase
Forest Fire Laboratory
Post Office Box 5007
Riverside, California 92507
Telephone: (714) 787-1579

FHRS
(Mid-Atlantic Region)

FAIRBANK HIGHWAY RESEARCH STATION
Washington, D.C.

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Research Program Administration and Technology Transfer	Technology transfer program.
AERODYNAMICS	
Test Facilities	Wind tunnel.
CIVIL ENGINEERING	
Highway Engineering	Highway engineering.
PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVENMENTS	
Transportation	Highway engineering.
URBAN AND REGIONAL TECHNOLOGY AND DEVELOPMENT	
Transportation and Traffic Planning	Transportation planning traffic engineering.

CONTACT:
Milton P. Criswell
Federal Highway Administration
HDV-20
2100 2nd Street, S.W.
Washington, D.C. 20590
Telephone: (202) 426-9230

FOREST SERVICE, LABORATORIES
U.S. Department of Agriculture
Washington, D.C. 20013

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Research Program Administration and Technology Transfer	Technology transfer program.
ENERGY	
Energy Use, Supply and Demand	Studies concerning use of wood.
ENVIRONMENTAL POLLUTION AND CONTROL	
Solid Wastes Pollution and Control	Techniques on recycling of waste wood products.
HEALTH PLANNING	
Environmental and Occupational Factors	Studies on value of trees to the environment.
MATERIALS SCIENCES	
Materials Degradation and Fouling	Information on wood deterioration, decay; prevention and control work,
MEDICINE AND BIOLOGY	
Botany	Information on tree anatomy, physiology, and pathology.
Ecology	Information on trees in regard to their environment.
NATURAL RESOURCES AND EARTH SCIENCES	
Mineral Industries	Information on the reclamation of strip-mined areas.

APPLICATION AREA	EXPERTISE
Natural Resource Management. . .	Information on the conservation and management of forested lands, grasslands, wildlife, water, and fire.
Natural Resource Surveys	Ongoing surveys of timberland.
Forestry	Information on all aspects of forestry.

URBAN AND REGIONAL TECHNOLOGY AND DEVELOPMENT

Environmental Management and Planning	Information on how vegetation can be utilized in improvement of urban environments.
Housing.	Information on proper insulation and also on housing renovations.

CONTACT: Harold G. Marx
Forest Service, Office of Deputy Chief,
Research, U. S. Dept. of Agriculture
14th & Independence Ave. Rm 3112
Washington, D. C. 20250
Telephone: (202) 447-7573

HARRY DIAMOND LABORATORIES
Adelphi, Maryland 20783

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Computer Application	Data base systems for management.
Research Program Administration and Technology Transfer	Research and development planning, contract management, technology transfer program.
ATMOSPHERIC SCIENCES	
Monitoring	Instruments for measuring the physical characteristics of fog and rain.
Physical Meteorology	Properties of fog and rain affecting radio, radar, and laser propagation.
BIOMEDICAL TECHNOLOGY AND HUMAN FACTORS ENGINEERING	
Biomedical Instrumentation and Bioengineering	Cardiac monitoring, PVC recognition system, telemetry, monitors of respiratory gases, computer simulation of the cardio-respiratory system.
Life Support Systems	Sensors for respirators and high altitude oxygen supply systems.
Prosthetics and Mechanical Organs	Blood pump to replace heart during surgery, heart-lung machine R&D, respirators.
General	Federal Laboratory Consortium contact for biomedical technology.

APPLICATION AREA	EXPERTISE
CHEMISTRY	
Physical and Theoretical Chemistry	Electrochemistry, battery chemistry, theoretical surface chemistry, molecular dynamics.
Polymer Chemistry	Potting compounds for electronic circuits.
COMMUNICATION	
Radio and Television Equipment	Portable radio equipment, telemetry.
COMPUTERS, CONTROL AND INFORMATION THEORY	
Computer Software	Graphics program design.
Control Systems and Control Theory	Digital control systems design.
Pattern Recognition and Image Processing	Image processing.
General	Computer control of experiments, automated data acquisition, and simulation.
DETECTION AND COUNTERMEASURES	
Acoustic Detection	Acoustic intrusion and motion detectors for use in both air and water media.
Electromagnetic and Acoustic Countermeasures	Radar and laser detection and ranging of people and vehicles, motion detection.
Infrared and Ultraviolet Detection	IR pulsed laser measurement.
Magnetic Detection	Detection and analysis of magnetic signatures.

APPLICATION AREA	EXPERTISE
Personnel Detection	Acoustic and radar intrusion detectors, seems to prevent surreptitios entry.
General	Acoustic and radar intrusion detectors, seems to prevent surreptitios entry.
ELECTROTECHNOLOGY	
Antennas	VHF and UHF antenna design; small and low weight antenna systems, conformed antennas, stripline antennas.
Circuits	RF, AF, and digital microelectronics especially for severe environments and high "g" conditions.
Optoelectronics Devices and Systems	Surface acoustic wave devices, IR laser sources, modulators and measuring instruments.
Power and Signal Transmission Devices	Miniature microwave power sources.
Resistive, Capacitive and Inductive Components	Thin and thick film technology.
Semiconductor Devices	IC design, PIN diodes, microwave power sources.
General	Wide expertise in microwave radar systems, digital signal processing and telemetry.
ENERGY	
Batteries and Components	Special long shelf life, reserve instrument batteries.
Energy Use, Supply and Demand	Fluidic process temperature controllers to prevent over heating in high temperature processes.

APPLICATION AREA	EXPERTISE
ENVIRONMENTAL POLLUTION AND CONTROL	
Air Pollution and Control	Fluidic pollutant gas concentration sensors.
GOVERNMENT INVENTIONS FOR LICENSING	
Electrotechnology	Electro-optical devices, ferroelectric devices.
Mechanical Devices and Equipment	Fluidic components, sensors, and systems.
Instruments	Fluidic gas concentration sensors.
HEALTH PLANNING	
Health Care Technology	Federal Laboratory Consortium contact for biomedical technology.
INDUSTRIAL AND MECHANICAL ENGINEERING	
Hydraulic and Pneumatic Equipment	Fluidic or flueric sensors and controls of all types.
LIBRARY AND INFORMATION SCIENCE	
Information Systems	Computerized information systems with on-line access to National Technical Information Service, Defense Documentation Center, and the Smithsonian Science Information Exchange.
MATERIALS SCIENCES	
Adhesives and Sealants	Potting materials for rugged electronics.
Plastics	Potting material, adhesives, dielectric materials.

APPLICATION AREA	EXPERTISE
MATHEMATICAL SCIENCES	
Operations Research	Statistics, system modeling, cost-effectivness analysis, system optimization, dynamic programming (especially geometric programming).
NUCLEAR SCIENCE AND TECHNOLOGY	
Nuclear Instrumentation	Neutron and X-ray spectroscopy, ionizing radiation dosimetry.
PHYSICS	
Fluid Mechanics	Theoretical analysis of confined flowfields, computer solutions of the Navier-Strokes equation, flow visualization.
Optics and Lasers	Coherent optical sources, near millimeter adherent sources, open resonator cavities, heterodyne systems.
Solid State Physics	Theoretical and experimental expertise in the dynamics of charge carriers in amorphous insulators, electron spin resonance, Hall effect, nonlinear electron transport, acousto-optic effects, ferroelectric, LSI capabilitits.
Plasma Physics	Theoretical calculations of the dynamic response of plasmas, experimental expertise on MEV and positive ion beams, diagnostic measurements with X-ray bent crystal spectrometers.
Radio Frequency Waves	Interactions of electromagnetic waves with matter.
General	Quantum theory, quantum electrodynamics.

111

APPLICATION AREA	EXPERTISE
TRANSPORTATION	
Air Transportation	Crash recorders and crash research telemetry systems, clear air turbulence detection.
Pipeline Transportation	Flow measurement.
Road Transportation	Crash recorders and crash research telemetry systems, anti-skid brake system.

CONTACT: Mr. Clifford E. Lanham
Harry Diamond Laboratories
ATTN: DELHD-TT
2800 Powder Mill Road
Adelphi, MD 20783
Telephone: (202) 394-2296
Autovon: 290-2296

U.S. ARMY HUMAN ENGINEERING LABORATORY
Aberdeen Proving Ground, Maryland 21005

APPLICATION AREA	EXPERTISE
BIOMEDICAL TECHNOLOGY AND HUMAN FACTORS ENGINEERING	
Human Factors Engineering. . . .	Display and information systems for operational control of large systems.
ENVIRONMENTAL POLLUTION AND CONTROL	
Noise Pollution and Control. . .	Occupational and environmental measurements.

CONTACT: Donald Egner
U.S. Army Human Engineering Laboratory
Aberdeen, Maryland 21005
Telephone: (301) 278-4567/4168
Autovon: 283-4567/4168

AIR FORCE HUMAN RESOURCES LABORATORY
Brooks AFB, Texas

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Management Practice.	Management and organizational behavior.
Research Program Administration and Technology Transfer. . . .	Research and development product utilization, technology transfer, contract management.
BEHAVIOR AND SOCIETY	
Job Training and Career Development.	Flying and technical training, job requirements, job classification, career progression, on-the-job training, and performance measurement (job evaluation).
Personnel Selection and Classification	Person-job matching, test development.
Psychology	Educational and industrial psychology, psychometrics, operations and cost analyses.
Social Concerns.	Wide-spectrum utilization of women throughout USAF job specialities.
General.	Man-vehicle interface, especially in flight simulation and maintenance simulation.

APPLICATION AREA	EXPERTISE
COMPUTERS, CONTROL AND INFORMATION THEORY	
Computer Software.	Modeling of manpower personnel system, occupational and assignment analyses, and development of computational algorithms for the behavioral sciences.
	CONTACT: COL Ralph S. Hoggatt Chief, Applications Office Air Force Human Resources Laboratory Brooks AFB, TX 78235 Telephone: (512) 536-3605

INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION
Forest Service, USDA
Ogden, Utah

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Research Program Administration and Technology Transfer. . . .	Technology Transfer.
NATURAL RESOURCES AND EARTH SCIENCES	
Forestry	Information on all aspects of forestry.

CONTACT:
Planning and Application AD
Intermountain Experiment Station
U.S. Forest Service
507 - 25th Street
Ogden, Utah 84401
Telephone: (801) 586-6286

149

INSTITUTE FOR TELECOMMUNICATION SCIENCES
Boulder, Colorado 80302

APPLICATION AREA	EXPERTISE
COMMUNICATIONS	
General.	General expertise in all elements of this application area.

Extensive expertise in the efficient use of the radio frequency spectrum, engineering and evaluation of communication systems and propagation and transmission of radio signals.

Current Institute programs utilize expertise in the following:

- Model performance tests
- Mobile satellite earth terminals
- Electronic message handling
- Microwave communication systems
- Evaluation of digital systems
- Optical communication systems
- Antenna design and measurement
- Atmospheric refractive index measurements
- Predicting propagation effects on radio systems

CONTACT: Dr. Bernard Wieder
Institute for Telecommunication Sciences
Boulder, Colorado 80302
Telephone: (303) 499-1000 ext. 3484
FTS: 323-3484

KENNEDY SPACE CENTER
Kennedy Space Center, Florida 32899

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Inventory Control	Inventory control system, stock level control methods, warehouse automation.
Management Information	Zero base budgeting, equipment management, resource management, operations management, program management.
Research Program Administration and Technology Transfer	Resources development and management, contract management, technical management, technology transfer for utilization and applications.
AERONAUTICS AND AERODYNAMICS	
Avionics	Aerodynamic/inertial/ballistic technology for devices and system operation. Navigation and flight control integration of systems composed of electronic, pneumatic, hydraulic, mechanical, etc., devices coupled to and by communication systems. Basic technology for design, integration, preflight testing, operation, and failure analysis of devices, components, systems and vehicles. GSE support equipment design, operation and logistic support.
Test Facilities and Equipment	Space vehicle preflight test equipment, GSE, controls, altitude chambers, vibration, acoustic, chemical, pneumatic, failure analysis support, instrumentation checkout and support facilities, computer-driven automation test facilities and equipment, launch support facilities, landing facilities and recovery support.

APPLICATION AREA	EXPERTISE
AGRICULTURE AND FOOD	
Agricultural Chemistry	Support laboratory chemistry expertise.
Agronomy, Horticulture and Plant Pathology	Support laboratory expertise.
Agricultural Resource Surveys	Remote sensing from aircraft and satellite surveillance of earth resources calibrated by ground truths of temperatures, water turbidity, vegetation growth, water resources, pollution, soil mapping, water runoff, etc.
ASTRONOMY AND ASTROPHYSICS	
Astrophysics	Property measurements of terrestrial and extraterrestrial materials.
ATMOSPHERIC SCIENCES	
Aeronomy	Research and instrumentation expertise in atmospheric gases as applied to ionization absorption and instrumentation anomalies. Measurement of launch vehicle environmental effects.
Dynamic Meteorology	Research and development of systems to instrument and display weather phenomena.
Meteorological Data Collection, Analysis, and Weather Forecasting	NOAA/AF support and KSC elements expertise developed to support prelaunch and launch missions.
Meteorological Instruments and Instrument Platforms	Systems development to instrument weather phenomena and display for NOAA support of prelaunch and launch mission.
Physical Meteorology	Development of meteorological instrumentation.

APPLICATION AREA	EXPERTISE
Weather Modification	Experimentation with weather modification as a means to modify weather during launch operations.
General	KSC meteorological NOAA support is for prelaunch and launch missions. Weather phenomena, especially lightning and related research, has been extensive at KSC.
BIOMEDICAL TECHNOLOGY AND HUMAN FACTORS ENGINEERING	
Prosthetics and Mechanical Organs	Development of prosthetic limbs.
Biomedical Instrumentation and Bioengineering	Instrumentation, data gathering, storage, processing and analysis of medical data (systems), mammograms; biomedical stimulation.
Human Factors Engineering	Man-machine integration and operation.
Life Support Systems	Cryogenic "SCAPE" suit environmental development and operation; altitude chamber environment operation; space environment simulation.
Bionics and Artificial Intelligence	Body stimulation (electrical). Computer generated analysis of medical statistical data.
General	Research and development of special projects in human engineering. Mission oriented life support systems development and operation. Development of standards and measuring techniques for low level electromagnetic energy effects to personnel.
BUILDING INDUSTRY TECHNOLOGY	
Architectural Design and Environmental Engineering	Design and construction of operational and mission support facilities. Environmental engineering to support mission and prevent environmental impact.

APPLICATION AREA	EXPERTISE
Construction Management and Techniques	Facilities required for Center mission conceived, designed, constructed, managed, operated and maintained.
Structural Analysis	Design engineering expertise for structures and facilities.
Building Standards and Codes	Design and construction of structures and facilities for operation and support functions in mission support.
Construction Materials, Components and Equipment	Commonplace and unique materials components and equipment; cryogenics, high temperatures, corrosion protection, exotic fuels and oxidizers, handling equipment, protective devices in line with mission.

CHEMISTRY

Analytical Chemistry	Chemical laboratory support operation and equipment, i.e., scanning electron microscope, gas chromatography, etc.
Polymer Chemistry	Characterization of polymers by weight, chemical, physical and electrical properties and other properties as applied to engineering, operation and analysis.
Physical and Theoretical Chemistry	Laboratory for mission support of launch center with investigative techniques for materials in analysis of failures requiring knowledge and expertise of physical and theoretical chemistry.

CIVIL ENGINEERING

Soil and Rock Mechanics	Structural analysis for load bearing capabilities of supporting soil and rock.

APPLICATION AREA	EXPERTISE
COMMUNICATIONS	
Radio and Television Equipment	Design, installation, test, maintenance of space and terrestrial equipment and supporting GSE ground tracking radar, DF, interferometers, transponders, telemetry, detection, instrumentation systems, remote control command systems, etc.
Common Carrier and Satellite	Microwave RF and carrier bay relay systems; satellite and/or vehicle telemetry tracking instrumentation.
Graphics	Mechanical, electronic, printed, chemical, alphanumeric, plotting, static and dynamic displays design, operation maintenance; "Image 100" analysis and display. Computer graphics, autographics.
Communication and Information Theory	Analog and digital information transmission reception processing, e.g., bandwidth considerations, data bit rate, etc.
COMPUTERS, CONTROL AND INFORMATION THEORY	
Computer Hardware	Commercial computers use individually, and systems; systems computer driven automated checkout equipment; fabricated computers and electronic logic circuits.
Computer Software	Programs for hardware of GSE and support equipment; space vehicle computer programs development and programming.
Control Systems and Control Theory	"Automatic Checkout Equipment" (ACE), Launch Processing System (LPS); systems designed for prelaunch and launch mission capability; time base

APPLICATION AREA	EXPERTISE
Control Systems and Control Theory (contd)	requirements of launch schedule drives complex automated testing, propellant loading, automatic sequencing.
Information and Processing Standards	Standards of format for equitable utilization of computer capabilities for intended use; selection of data techniques for maximum reliability or loss and misinterpretation of data.
Information Theory	Analysis of transmission data requirements and formulation of equipment and systems to fulfill requirement.
Pattern Recognition and Image Processing	Image enhancement techniques and analysis; Image 100 color analysis and presentation; dynamic prediction of trend by computer programming; analog to digital conversion and processing; feature extraction and enhancement; development of a ground operations computer language (special purpose languages).
DETECTION AND COUNTERMEASURES	
Acoustic Detection	Instrumentation of noise generated by launches; dead room; sound propagation research and development devices.
Electromagnetic and Acoustic Countermeasures	Radar and laser instrumentation and systems.
Infrared and Ultraviolet Detection	Infrared and ultraviolet instrumentation.
Magnetic Detection	Magnetic and magnetic effects instrumentation, e.g., lightning current measurement.
Optical Detection	Optical tracking instrumentation; fiber optics communications systems.

APPLICATION AREA	EXPERTISE
Radio Frequency Detection	EMI surveillance and detection; radio, radar, systems, etc.
Seismic Detection	Instrumentation of earth parameters.
ELECTROTECHNOLOGY	
Antennas	Design, innovate, fabricate devices, systems, test (anechoic chamber), instrument, calibrate, operate antenna farms, facilities, GSE and vehicle.
Circuits	Design, innovate, fabricate components systems test, calibrate, operate for GSE and vehicles, repair and support.
Electromechanical Devices	Electrical motors, generators, drives, etc. large and small devices and systems.
Electron Tubes	Systems utilization, cathode ray, image orthicaon, etc., RF, audio, microwave.
Optoelectronic Devices and Systems	Fiber optics development, operation, tracking devices, detection systems.
Power and Signal Transmission Devices	Power generation, transformation, transmission systems, cable, waveguides, antennas, protective devices, insulators, filters, etc.
Resistive, Capacitive and Inductive Components	System utilization design, innovation development.
Semiconductor Devices	Power devices, systems component utilization, e.g., mission support GSE and flight hardware, integrated circuitry, drive, instrumentation detection, resolution, logic and computer devices, launch processing and support equipment.

APPLICATION AREA	EXPERTISE
ENERGY	
Energy Use, Supply and Demand	Management of energy consumption and capacity; supply and demand; supply and projections; technological advances and impacts on environment, population and industry; energy conservation methods, techniques and hardware for energy conservation.
Electric Power Transmission	Engineering design and construction of facility support capability to support launch center mission for electric power transmission and distribution.
Heating and Cooling Systems	Facility heating and cooling design; design and construction and maintenance of cryogenic systems to support space vehicle launch operations with inherent need for isolating and insulating techniques.
Engine Studies	Research of energy components in exhaust causing ionization, conducting and absorption of electrical and electromagnetic energy as applied to rocket motors.
Solar Energy	Solar collectors, systems design, testing and evaluation; facility design for insulation from solar energy; remote sensing and calibration of sensing instrumentation.
Miscellaneous Energy Conversion and Storage	Fuel and oxidizer storage and transfer systems; cryogenics storage and handling; system design for chemical/electrical energy storage; lightning research and protective systems and measures.

APPLICATION AREA	EXPERTISE
ENVIRONMENTAL POLLUTION AND CONTROL	
Air Pollution and Control	Sensing systems for Booster Exhaust Systems Test (BEST).
Noise Pollution and Control	Sound measurements of launch vehicles.
Solid Wastes Pollution and Control	Studies of known and used disposal methods on a world-wide and national basis completed.
Water Pollution and Control	The following advanced and improved concepts and laboratory tests: Pond aeration of liquid waste, pond oxygenation, pond chlorination, pond ozonization, chemical neutralization, absorption by water hyacinths, bacterial decomposition; measurements of noxious vegetation clogging fresh water bodies.
Pesticides Pollution and Control	Investigations in the use of remote sensing for detection of diseased citrus trees; sensing of pesticide runoff.
Radiation Pollution and Control	Instrumentation and sensing of radiation and control of devices in use.
Environmental Health and Safety	Occupational health facility and statistical data gathering for normal and stress conditions; computerized systems for Medical Information Management Systems (MIMS) and Computer Assisted Diagnostics (CAD).
Environmental Impact Statements	Facility developments requiring impact statements and research for impact to the National Wildlife Refuge; NFWS-FWS cooperative effort at KSC.

APPLICATION AREA	EXPERTISE
General	Laboratory support for analyzing various aspects of pesticides, chemicals, agricultural needs, etc.
GOVERNMENT INVENTIONS FOR LICENSING	
Mechanical Devices and Equipment	Disclosures developed resulting from KSC expertise; design, operations and innovations.
Biology and Medicine	Devices developed from expertise in allied field; artificial limbs, interface electrodes, etc.
Metallurgy	Support laboratory expertise developed technology.
Electrotechnology	Systems design of launch and operation/checkout oriented systems.
Instruments	Test support instrumentation developed systems and special projects development support; lightning research, atmospheric instrumentation, tracking devices, remote sensing, transducers and systems, etc.
Optics and Lasers	Systems development and devices for KSC mission.
Ordnance	Ordnance use and test methods.
HEALTH PLANNING	
Planning Methodology	Occupational health program for KSC, Medical Information Management System Computer Assisted Diagnostic and other automated medical programs.
Agency Administrative and Financial Management	Operation of health facility; planning for future needs.

APPLICATION AREA	EXPERTISE
Health Care Assessment and Quality Assurance	Federal Employee Health Program, qualification, education and testing program for hazardous operations.
Health Care Measurement Methodology	Stress laboratory testing and statistical data correlation.
Environmental and Occupational Factors	Program for safety of personnel engaged in toxic fuels and oxidizers, cryogenic liquids and ordnance materials.
Health Care Technology	Technology as applied to KSC mission.
Personal Health Care Services	Facility and services to support KSC mission and personnel involved.
Health Care Needs and Demands	KSC mission support; needs and demands of personnel in future programs.
Health Resources	Medical facility and ancillary equipment, stress laboratory for statistical evaluation.
Health Education	Program for dissemination of health information to employees.
Data and Information Systems	Medical Information Management System for storage of medical data; Computer Assisted Diagnostic and "INTERNIST" programs for future missions and computerizing of medical data. Image enhancement applied to X-ray and sound measurements of body tissue.
INDUSTRIAL AND MECHANICAL ENGINEERING	
Production Planning and Process Controls	Support operations for KSC schedules and mission performance.

APPLICATION AREA	EXPERTISE
Quality Control and Reliability.	Quality control and reliability at KSC level, design engineering, vehicle engineering, test support and support operations; organizations for specific functions of QC and reliability engineering.
Plant Design and Maintenance . .	Plant engineering and maintenance for support of KSC mission.
Environmental Engineering. . . .	Design engineering inclusive of environmental functions; instrumentation and measurement of Booster Exhaust Systems Tests.
Tooling, Machinery and Tools . .	Support tooling, machinery and tools for testing launch, and maintenance of equipment.
Manufacturing Processes and Materials Handling	Special projects, components, systems design fabrication and materials control, traceability programs in government and contractors manufactured products.
Industrial Safety Engineering. .	Safety engineering and control of center activities associated with launch center operations.
Hydraulic and Pneumatic Equipment.	Ground support equipment for testing and launch operations.
Nondestructive Testing	Support laboratory for testing, failure analysis and studies.

LIBRARY AND INFORMATION SCIENCES

Information Systems.	Technical library for KSC support: computer services for payroll and personnel; computer controlled and automated testing and launch oriented information systems.

162

APPLICATION AREA	EXPERTISE
MATERIAL SCIENCES	
General	A KSC materials program in association with the design center for vehicle, spacecraft and GSE materials control is enforced at KSC and at contractor facilities by the expertise of the responsible organization.
MATHEMATICAL SCIENCES	
Analysis (Mathematics)	Math modeling for projects and special studies; mathematical analysis for computer programs.
Operations Research	Support operations provides capability in additions to directorate functional capability.
Statistical Analysis	Statistical quality control and logistic support analysis; Center support in projects and studies, e.e., risk management systems.
MEDICINE AND BIOLOGY	
General	Research in image enhancement of body tissue instrumentation; X-ray and sound.
NATURAL RESOURCES AND EARTH SCIENCES	
Geology and Geophysics	Facility design engineering requires unique geological and geophysics expertise at KSC.
NAVIGATION, GUIDANCE, AND CONTROL	
Control Devices and Equipment	Instrumentation devices and systems design and fabrication; remote sensing, control and testing and operation.
Guidance Systems	Space vehicle/spacecraft guidance systems testing and operation.

APPLICATION AREA	EXPERTISE
Navigation and Guidance Systems Components	Devices for detection/sensing, instrumenting, combining and computing; testing.
Navigation Systems	Systems design, fabrication, testing and operations.
NUCLEAR SCIENCE AND TECHNOLOGY	
General	Testing of devices/systems aboard spacecraft; personnel safety and environmental protection measures.
OCEAN TECHNOLOGY AND ENGINEERING	
Oceanographic Vessels, Instruments and Platforms	Transport vehicles designed and operated for specific use in launch mission, i.e., transport by water of launch vehicle to launch site; launch support and recovery vehicles; underwater debris recovery.
ORDNANCE	
Ammunition, Explosives and Pyrotechnics	Launch vehicle, spacecraft, etc., ordnance storage, testing, installation.
PHOTOGRAPHY AND RECORDING DEVICES	
Holography	Laboratory support expertise.
Photographic Techniques and Equipment	Electronic image enhancement, infrared and visible mapping, temperature sensing and mapping; photo operation facility/laboratory equipment; laboratory X-ray, Gamma ray, and clean room photo equipment; printed circuit photography; X-ray enhancement applied to materials analysis and special research of body tissue.

APPLICATION AREA	EXPERTISE
Recording Devices.	Measurement display and recording laboratory; photo-magnetic tape, oscillograph, digital memory/computers punched tape/cards, instrumentation, etc.
General.	Launch support; photography, sound, environmental effects, etc.
PHYSICS	
Acoustics.	Sound spectrum and level measurements; ultrasonic cleaners, vibration testers and sound frequencies applied to non-destructive testing; audio/acoustic communication systems.
Optics and Lasers	Optical communication systems; fibre optics.
Radio Frequency Waves	Electromagnetic measurements and analysis; radio frequency systems design, fabricating and operation/tracking; electromagnetic discharge measuring/instrumentation systems.
PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS	
Human Resources.	Limited program of KSC individuals assigned to state as technology coordinator; limited availability for consulting by KSC technical staff based on workload.
Police, Fire and Emergency Services	Cooperative operations with state and local services, e.g., deputized KSC patrol; special projects for fire protection equipment transferred to civil sector; transfer of special hazard equipment and facilities developed for support services.

APPLICATION AREA	EXPERTISE
Energy	Cooperative effort with Florida Solar Energy Center. Energy saving devices developed.
Environment.	Center facility development environmentally conscious; KSC is a National Wildlife Refuge; special projects for wildlife preservation; Booster Exhaust Study Test of pollutants from launch vehicles.
Transportation	KSC support of Dade County (FL) mass transit program development, e.g., transfer of technology; special projects.
General.	Designed facilities involving pipeline transportation of hazardous, nonhazardous, cryogenics, fuels, oxidizer, corrosive, noncorrosive, etc., liquids and gasses, piping above ground, below ground, underwater, etc.

URBAN AND REGIONAL TECHNOLOGY DEVELOPMENT

Environmental Management and Planning	KSC facilities planning for launch oriented facilities, Visitors Information Center planning, Wildlife resources planning, waterways planning and environmental impacts, manpower and resources planning.
Communications	Networks of radio, wire, microwave telephone, wideband video circuits and terminals; optical communications.
Health Services.	Occupational health services, training for hazardous services in cryogenics, toxic gases, etc.

APPLICATION AREA	EXPERTISE
Emergency Services and Planning	Research and development in space age technology for use at KSC adaptive and transferred to civil sectors; special projects for civil development of services found functionally useful at KSC.

CONTACT: Mr. Raymond J. Cerrato
Mail Stop: SA-RTP
NASA
Kennedy Space Center, FL 32899
Telephone: (305) 867-2780

LANGLEY RESEARCH CENTER
Hampton, Virginia 23665

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Inventory Control.	Equipment and stock management and control.
Research Program Administration and Technology Transfer. . . .	Financial management, analysis, and control; personnel and training; scientific program management operations; Technology Utilization and Applications Program management.
AERONAUTICS AND AERODYNAMICS	
Aerodynamics) Aeronautics). . . . . Aircraft)	Fundamental and applied research in aerothermodynamics, fluid mechanics, propulsion aerodynamics, performance, stability and control, stall/spin, airfoil development, STOL/VTOL, in all flight regimes; conceptual studies; systems studies; aircraft design; requirements; safety and operating problems; wind tunnel and gas dynamics testing laboratories.
Parachutes and Decelerators. . .	Configuration development and test of transonic and supersonic decelerators.
Avionics	Digital flight controls; active controls technology; terminal configured aircraft (operations, landing displays, flight testing); microwave landing systems; fluidics; automatic flight control systems.
Test Facilities and Equipment. .	Subsonic, transonic, and supersonic wind tunnels; V/STOL tunnel; full-scale wind tunnel; scramjet test facility; aircraft noise reduction facility; differential maneuvering simulator.

APPLICATION AREA	EXPERTISE
ATMOSPHERIC SCIENCES	
Aeronomy	Fundamental processes; chemical rates; sources and sinks.
Dynamic Meteorology	Severe storms and local weather research; climate sensitivity and model development.
Meteorological Data Collecting Analysis and Weather Forecasting	Climate research; earth radiation budget experiment.
Meteorological Instruments and Instrument Platforms	Microwave techniques for meteorological research.
BEHAVIOR AND SOCIETY	
Job Training and Career Development	Planning, development, and administration of scientific and technical training programs.
BIOMEDICAL TECHNOLOGY AND HUMAN FACTORS ENGINEERING	
Biomedical Instrumentation and Bioengineering	Application of aerospace instrumentation and materials to biomedicine and bioengineering.
Human Factors Engineering	Cockpit simulations; visual displays; eye tracking.
BUILDING INDUSTRY TECHNOLOGY	
Architectural Design and Environmental Engineering	Planning and engineering for construction, maintenance, remodeling of buildings and interiors, and environmental systems.
Structural Analyses	Analysis of structural engineering designs of research facilities and equipment.

169

APPLICATION AREA	EXPERTISE
Building Equipment, Furnishings, and Maintenance	Plan, direct, and coordinate technical, mechanical, electrical, and maintenance services for research facilities and equipment.
CHEMISTRY	
Polymer Chemistry	Basic and applied research to develop and modify polymeric materials for aerospace applications.
Basic and Synthetic Chemistry	Chemistry of pollutant formation and interaction of pollutants with air and water.
Photo and Radiation Chemistry	Environmental effects on materials; development of molecular lasers; heterodyne spectrometry.
Physical and Theoretical Chemistry	Reactor and photovoltaic power systems; flow field chemical kinetics.
COMPUTERS, CONTROL AND INFORMATION THEORY	
Computer Hardware	Data handling requirements; design and development of specialized equipment.
Computer Software	Development and application of advanced software and modeling techniques.
Control Systems and Control Theory	Analysis, design, and synthesis of manual and automatic stability and control systems; optimization of mechanics problems; guidance theory and applications.
Information Processing Standards	Development of programs, computational procedures, data recording, transmission, and presentation.

APPLICATION AREA	EXPERTISE
Information Theory	Development of techniques and applications of mathematics and computer theory to solution of aerospace computational problems.
Pattern Recognition and Image Processing	Image restoration and enhancement; multispectral image data analysis and spectral reflectance estimation; multispectral data classification and compression.
DETECTION AND COUNTERMEASURES	
Acoustic Detection	Duct acoustics; airframe noise research; acoustic methods for detecting stress in bolts.
Infrared and Ultraviolet Detection	Electronic materials; epitaxial growth techniques; electronic device processing; spectrometer and photometric systems; remote sensing applications.
ELECTROTECHNOLOGY	
Antennas	Tracking transponders.
Circuits	Control techniques; Kalman filtering; telemetry systems.
Electromechanical Devices	Experimental avionics systems; fly-by-wire techniques; prototype development of pneumatic, hydraulic, flueric, and electronic controls.
Optoelectronic Devices and Systems	IR and UV detectors and arrays -- sensing, display, data handling.
Power and Signal Transmission Devices	Command and power systems and components; transducers; telemetry systems.

APPLICATION AREA	EXPERTISE
Semiconductor Devices.	Advanced solid state electronic device and sensor material processing and property technology; optimization of devices and associated systems.
ENERGY	
Heating and Cooling Systems.	Systems requirements and design specifications for plant and research HVAC facilities.
Solar Energy	Design, test, evaluation of solar systems and components for space heating and cooling and water heating.
ENVIRONMENTAL POLLUTION AND CONTROL	
Air Pollution and Control. . . .	Measurement techniques and systems definition for remote sensing of atmospheric quality; lab and field tests; physical chemistry of atmospheric pollutants.
Noise Pollution and Control. . .	Mechanism of noise generation; subjective response of people to aircraft noise; anechoic test facility; aircraft noise reduction laboratory.
Water Pollution and Control. . .	Definition of systems and techniques for in situ and remote monitoring of marine environmental quality; lab and analytical study of physical chemistry of water pollutants.
GOVERNMENT INVENTIONS FOR LICENSING	
Mechanical Devices and Equipment.	Hydrofoil system to direct and control outfall waste; fatigue failure load indicator; handlemeter for fabric "feel"; angular momentum control device; inkjet color printer control interface; inflatable life raft.

APPLICATION AREA	EXPERTISE
Chemistry	Diamine hardeners for epoxies; polyimide adhesives for titanium and composite bonding.
Biology and Medicine	Miniature diaphragm valve for medical equipment; bacteria strain for eschar debridement.
Electrotechnology	Very low-power power supplies; multiple layer printed wiring trace connector.
Instruments	Miniature angular position transducer; edge-following algorithm for tracking geological features.
Optics and Lasers	Optical profilometer; directional laser velocimeter; portable solar radiometer to measure stack plume effluents.
INDUSTRIAL AND MECHANICAL ENGINEERING	
Nondestructive Testing	Development and utilization of methods to verify material and structures integrity.
LIBRARY AND INFORMATION SCIENCES	
Operations and Planning	Management and operation of scientific and technical library facility.
Information Systems	Operation of document retrieval terminal.
MATERIALS SCIENCES	
Ablative Materials and Ablation	Development of ablative materials; experimental studies of ablators; high temperature materials lab and test facilities.
Adhesives and Sealants	Research to develop and modify polymers for adhesive qualities.

APPLICATION AREA	EXPERTISE
Carbon and Graphite	Characterization and behavior of structural materials; fatigue behavior.
Ceramics, Refractories, and Glass	Materials testing.
Coatings, Colorants, and Finishes	Basic and applied research on polymeric materials for films, thermal control or UV-resistant coatings.
Composite Materials	Characteristics and behavior of resin-matrix and metal matrix composites; environmental tests and flight service evaluation; mechanisms of degradation and failure; structures and materials test lab.
Corrosion and Corrosion Inhibition	Research to identify corrosion characteristics of advanced structural materials in operating environments.
Elastomers	Investigation of elastomer additions to modify brittle high-temperature plastic materials.
Nonferrous Metals and Alloys	Evaluation of fracture characteristics; operation of fatigue lab.
Plastics	Development of better resins and adhesives for graphite reinforced composites; environmental testing.

MATHEMATICAL SCIENCES

Algebra and Number Theory	Development and application of mathematical and computer theory to solution of aerospace research problems.
Analysis (Mathematics)	Development of mathematical analysis techniques; math models for solution of aerospace-related research.
Mathematical Logic	Applications to computations in automatic data processing systems.

APPLICATION AREA	EXPERTISE
NAVIGATION, GUIDANCE AND CONTROL	
Control Devices and Equipment	Design, development, and optimization of manual and automatic control systems for aircraft, spacecraft, entry vehicles.
Guidance Systems	Analysis and prototype development of new concepts; application of control techniques (Kalman filtering) for inertial systems; flight experiments.
Navigation and Guidance System Components	Evaluation and testing.
Navigation Systems	Analysis and prototype development of advanced concepts; flight evaluation.
NUCLEAR SCIENCE AND TECHNOLOGY	
Nuclear Auxiliary Power Systems	Gas core reactor power subsystems for future spacecraft applications.
OCEAN TECHNOLOGY AND ENGINEERING	
Oceanographic Vessels, Instruments and Platforms	Requirements and systems for remote and in situ monitoring of environmental quality; verification tests of marine sensors.
PHYSICS	
Acoustics	Duct acoustics; flow-surface interaction noise; noise generating mechanism; vorticity modeling.
Fluid Mechanics	Aerodynamic heating; skin friction; interference flows; boundary layer transition; shear flow; recirculation flow; computational methods for 3-D boundary layers; mathematical modeling of fluid flow.

APPLICATION AREA	EXPERTISE
Optics and Lasers	Laser and holography techniques; nuclear-pumped laser technology; remote sensing.
Solid State Physics	Material properties and processing of advanced solid state electronic devices and sensors.
Structural Mechanics	Mechanisms of degradation and failure in structural materials; fracture mechanics.
Plasma Physics	Experimental studies of flow field chemical kinetics using shock tubes, expansion tubes, etc.
Radio Frequency Waves	Research on techniques for radiation, propagation or scattering of electromagnetic energy related to communications, radiometric applications -- VLF through millimeter wave frequencies.
PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS	
Energy	Energy audits; solar heating applications; infrared thermography.
Environment	Atmospheric pollution measurements; water quality measurements.
TRANSPORTATION	
Air Transportation	Requirements for future aeronautical systems; conceptual designs; market demands; economic returns; technology impact; flight research.
Transportation Safety	Aircraft airworthiness; develop airworthiness criteria; tests and simulator investigations; operating procedures.
Global Navigation Systems	Advanced technology planning for large area space systems.

LASL
(Mid-Continent Region)

UNIVERSITY OF CALIFORNIA
LOS ALAMOS SCIENTIFIC LABORATORY
P. O. Box 1663
Los Alamos, New Mexico 87544

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Research Program Adminstration and Technology Transfer. . . .	Industry Liaison--commercialization of research results, industrial participation programs; general research program administration.
AGRICULTURE AND FOOD	
Agricultrual Chemistry	Fertilizer utilization tracers (stable isotopes of C, N).
Agricultural Equipment, Facilities and Operations. . .	Implantable transponder for large-animal identification and health monitoring.
Animal Husbandry and Veterinary Medicine.	Hyperthermia, using localized RF current fields for treatment of animal tumors, such as cattle "cancer eye"; rapid broad-spectrum disease detection by automated immunologic and cytofluorometric techniques; remote animal identification and state of health by passive implanted transponder.
ASTRONOMY AND ASTROPHYSICS	
Astrogeology	Lunar composition.
Astrophysics	Astrophysical fluid dynamics; stellar hydrodynamics; pulsating variable stars; supernovae; properties of interstellar medium; stellar opacities.

APPLICATION AREA	EXPERTISE
Cosmic Ray Research	Radiochemical monitoring of particle fluences in space.
General	Solar phenomena; shaped charges for mapping the earth's magnetic field; special cameras and novel instruments.
ATMOSPHERIC SCIENCES	
Meteorological Data Collection, Analysis and Weather Forecasting	Analysis of gases and particulate matter; tracing air flow patterns with mass 21 methane.
Meteorological Instruments and Instrument Platforms	Airborne mass/size samples.
Physical Meteorology	Heavy methane atmospheric tracers on regional and global scale.
BEHAVIOR AND SOCIETY	
Job Training and Career Development	Electronic technician training; development programs for electronics staff.
BIOMEDICAL TECHNOLOGY AND HUMAN FACTORS ENGINEERING	
Biomedical Instrumentation and Bioengineering	Portable hyperthermia equipment for cancer treatment; electronic instrumentation for tumor detection; implantable monitoring apparatus; cell sensing and sorting by flow cytofluorometry and light scattering.
Human Factors Engineering	Display and information systems for operational control of large systems.
Life Support Systems	Evaluation, selection and proper use of respirators; training in respirator use.

APPLICATION AREA	EXPERTISE
Prosthetics and Mechanical Organs	^{238}Pu radioisotopic heat source fabrication for the artificial heart.
General	Radiopharmaceutical tracers.
BUILDING INDUSTRY TECHNOLOGY	
Architectural Design and Environmental Engineering	Control, monitoring of solar heating and cooling systems; explosion containment structures and vessels.
CHEMISTRY	
Analytical Chemistry	Gas, solids, spark-source, mass spectrometry; infrared, ultraviolet, visible and Fourier transform spectroscopy; electron and Auger spectroscopy; electron- and ion-beam microprobe analysis; scanning and transmission electron microscopy; gas and liquid chromatography; neutron activation analysis; NMR; atomic absorption; X-ray fluorescence and absorption; X-ray diffraction; radiochemical analysis; ion exchange resin and solvent extraction separations; fluorometry; inert-gas and vacuum fusion; wet-chemical analysis; neutron counting; visible and ultraviolet spectrophotometry; gamma scanning; gamma ray spectroscopy; titrations involving amoerometric, coulometric, photometric and potentiometric measurements; analytical chemistry of Pu, U and other actinides; trace element analysis.
Basic and Synthetic Chemistry	Radiochemical techniques; actinide and transition element chemistry; synthesis of organic compounds containing ^{13}C, ^{15}N and ^{18}O for biochemistry, diagnosis and environmental tracers.

APPLICATION AREA	EXPERTISE
Industrial Chemistry and Chemical Process Engineering	Hot cell chemistry.
Photo and Radiation Chemistry	Laser photochemistry; laser-induced fluorescence; laser spectroscopy.
Physical and Theoretical Chemistry	Molecular structure (X-ray, NMR spectroscopy); cross-beam dynamics; chemical kinetics: gas phase, aqueous redox; chemical thermodynamics: enthalpies of formation of minerals, metal oxides and carbides, free energy and activity in metal alloys; basic surfacstudies and interactions with gases including catalysis studies, by low-energy X-ray diffraction and Auger electron and photoelectron spectroscopy; explosive performance and theory, reaction times. Theoretical molecular dynamics and molecular structure; reaction kinetics; thermochemistry. Fundamental investigations of uranium optical spectra.
CIVIL ENGINEERING	
Soil and Rock Mechanics	Shockwave response (Hugoniot, stress-wave propagation, sound speeds, fracture, jet penetration, blast models).
General	Blastwave damage and safety.
COMMUNICATION	
Communication and Information Theory	Studies and implementation of fiber optic data communication system.
Radio and Television Equipment	Operation and maintenance of industrial radio systems.

APPLICATION AREA	EXPERTISE
COMPUTERS, CONTROL, AND INFORMATION THEORY	
Computer Hardware	Organization and logical design; special hardware design and maintenance; interactive systems; networks; graphics; color, three-dimensional, holographic; design and development of microprocessor systems; implementation of minicomputer systems.
Computer Software	Language design and implementation; numerical analysis; symbolic computation; combinatorial algorithms; operating systems; data base systems; performance modeling and analysis; graphics; software portability; applications software for minicomputers and microprocessors; computer data acquisition and control.
Control Systems and Control Theory	General expertise--e.g., building system controls, tracking systems for solar eclipse studies, NIM/CAMAC control systems.
Pattern Recognition and Image Processing	Image digitizing and processing; feature extraction and enhancement.
DETECTION AND COUNTERMEASURES	
Acoustic Detection	Ranging and bearing systems.
Nuclear Explosion Detection	Seismic, teleseismic, earth electromagnetics, strain-tilt instrumentation.
Seismic Detection	For nuclear explosion detection and yield verification.
ELECTROTECHNOLOGY	
Antennas	Design, characterization and test of antenna systems in various propagation media.

181

APPLICATION AREA	EXPERTISE
Circuits	High-speed signal detection, display and generation; fast transient analysis and recording; high-speed oscilloscope and digital systems; digital logic system design for numerous applications; nuclear applications.
Electromechanical Devices	Application to control of systems such as tracking platforms, nuclear reactors.
Electron Tubes	R&D on high-temperature, ultraminiature, planar tubes, "integrated thermionics."
Optoelectronic Devices and Systems	Design and test of optical signal systems; fast electro-optic detectors; fiber-optic transmission lines; high-speed avalanche photodiode fabrication; X-ray intensifier screens; image intensifiers.
Power and Signal Transmission Devices	Power system simulation.
Resistive, Capacitive and Inductive Components	R&D into components for high-temperature instrumentation.
Semiconductor Devices	Detector and gain device design and fabrication; response to shockwaves.
General	High-voltage engineering: systems, cables, switches; fast oscilloscope development (5-10 GHz); explosive-driven fuses, switches, generators; hybrid electronics facility for high reliability circuit development and fabrication, especially for space instrumentation.

ENERGY

Electric Power Transmission	Superconducting dc transmission and superconducting materials; modeling.

APPLICATION AREA	EXPERTISE
Energy Use, Supply and Demand. .	Mathematics of energy systems; economics and resource modeling; mathematical analysis of input-output economic-ecologic regional energy models.
Engine Studies	Fluid dynamics of the internal combustion engine.
Environmental Studies.	Radionuclide migration; impact of trans-Alaska pipeline; hot rock geothermal energy; coal combustion in arid environments; shale extraction and processing; pollution transport; air sampling; stack monitoring; trace element analysis.
Fuel Conversion Processes. . . .	Design of thermochemical cycles for coal gasification and H_2 generation.
Geothermal Energy.	Hot rock geothermal energy; site selection and evaluation, reservoir analysis and modeling, high-temperature hard rock drilling, hydraulic fracturing, special instrumentation, environmental monitoring, high-temperature well-logging instrumentation, rock-water chemical interactions, energy transfer and conversion cycles, hydrodynamics of geothermal extraction systems.
Heating and Cooling Systems. . .	Modeling on hybrid computer.
Policies, Regulations and Studies.	Energy-economic-environmental studies for the Rocky Mountain Region.
Selected Studies in Nuclear Technology	Electronuclear breeding feasibility experiments; radiation damage studies of fission and fusion reactor materials.

APPLICATION AREA	EXPERTISE
Solar Energy	Active and passive systems for heating; absorption-chiller and Rankine cycle cooling; heat storage; development of handbooks for solar energy system design; thermochemical cycle design; modeling and monitoring of solar energy systems; collector and collector surface design.
Miscellaneous Energy Conversion and Storage	Superconducting magnet energy storage; electrochemical heat engine development; thermionic conversion and materials; all areas of nuclear energy.
General	Conservation--Heat recovery with heat pipes; Fossil--Performance of blasting agents; response of geologic materials (oil shale, devonian shale, coal etc.) to shockwaves and jets.

ENVIRONMENTAL POLLUTION AND CONTROL

Air Pollution and Control	Industrial emission studies, sampling devices and transport measurements; high altitude sampling; SO_2 emission control.
Environmental Health and Safety	Radiation and hazardous chemical surveillance.
Environmental Impact Statements	Preparation, review and comment.
Noise Pollution and Control	Occupational and environmental measurements.
Radiation Pollution and Control	Low-level plutonium analyses; radionuclide migration; container, transport, and disposal technology, incineration of low-level radioactive wastes; liquid radioactive waste disposal; evaluation of current practice for transuranic nuclide disposal.

APPLICATION AREA	EXPERTISE
General	Environmental monitoring of geothermal reservoir development.
GOVERNMENT INVENTIONS FOR LICENSING	
Biology and Medicine	Flow microfluorometry.
General	"Subterrene" rock melting penetrator for specialized drilling applications.
INDUSTRIAL AND MECHANICAL ENGINEERING	
Manufacturing Processes and Materials Handling	Fabrication of W, Ta and its alloys, Nb, Mo, including welding and joining, casting, metalcasting, rheocasting, thixotropic casting, computer simulation of casting processes; GTA welding, electron-beam welding, laser welding, HERF, explosive metal working and all conventional fabrication techniques; interlying distances, detonability, etc., of energetic chemicals.
Nondestructive Testing	All aspects, including explosives; neutron, γ and β radiography (including very low energy); ultrasonics; eddy current transmission and scattered radiation (α, β, γ) gauging; potential drop; passive nuclear radiation; liquid penetrants for crack detection; acoustic emission; holography; magnetic particle; thermal conductivity; X-ray fluorescence; scanning electron microscopy; muonic X-ray analysis for elemental composition; computer-aided tomography.
Quality Control and Reliability	Quality assurance for electronics fabrication.
Tooling Machinery and Tools	Explosive forming.

APPLICATION AREA	EXPERTISE
MATERIALS SCIENCES	
Ablative Materials and Ablation	Carbide-graphite composites for nose cones and rocket nozzle insert applications.
Adhesives and Sealants	Elastomer evaluation and development.
Carbon and Graphite	Highly developed fuel element technology has evolved based upon artificial graphites and carbonaceous materials.
Ceramics, Refractories, and Glass	Slip casting, cold press sintering, hot pressing of pure oxides, carbides, nitrides, mineral synthesis. Hot isostatic pressing, vacuum hot pressing, complete power characterization, porcelain enameling, glazing, oxyacetylene and plasma-arc spraying, extrusion, joining, ceramic-to-metal seals, radiation damage in ceramics, mechanical properties of ceramic.
Coatings, Colorants, Finishes	Electrochemical processes, CVD, PVD, sputtering, epoxy, painting, surface finishing.
Composite Materials	Carbide-graphite composites, fiber reinforced composites.
Corrosion and Corrosion Inhibition	Corrosion of ferrous and nonferrous metals by H_2; corrosion of various steel and composition drum materials for containing radioactive wastes; evaluation of various corrosion inhibitors; effects of radiolysis and radiolysis products on corrosion.
Elastomers	General development and processing of elastomers for seals, gaskets, corrosion resistance, etc.

APPLICATION AREA	EXPERTISE
Iron and Iron Alloys	Metallurgical evaluations of fracture toughness, fabricability, weldability, and resistance to H_2 embrittlement. Expertise includes drop-weight-tear testing, notched and unnotched toughness testing; all types of mechanical and physical property measurement, GTA welding, electron beam welding, laser welding, HERF, explosive metal working and all conventional fabrication techniques.
Nonferrous Metals and Alloys	Physical metallurgy of noble metal (Pt- or Ir-based) alloys. Mechanical properties at high strain rates. Metal behavior under biaxial loading. Physical metallurgy of plutonium.
Plastics	All methods of formulation, transfer, compression, injection molding, casting, potting, slurry coating, electrophoresis, etc.
Miscellaneous Materials	Graphite technology, carbide-carbon composite fabrication and synthesis, chemical vapor deposition, physical vapor deposition, sputtering, thin and thick film technology.
Refractory Metals and Alloys	Evaluation of W, Ta and its alloys, Nb, Mo.
General	Induction Heating: RF generator design and control; induction furnaces to 4000°C; melting without crucibles; heavy duty self-shielding induction heating coils; directional solidification; induction plasma above 15,000°C; high frequency power distribution and control; brazing and welding; special alloys; wide variety of spheres; material purification; vaporization; thermal shock. Optical Materials; Fabrication, polishing, laser damage measurements. Shockwave response, R&D and clean room for fabrication of nuclear particle detector semiconductor and rare-gas liquid materials.

APPLICATION AREA	EXPERTISE
MATHEMATICAL SCIENCES	
Algebra and Number Theory	General competence.
Analysis (Mathematics)	General competence.
Geometry	General competence.
Mathematical Logic	General competence.
Operations Research	Linear and nonlinear modeling and optimization; data base management; Bayesian reliability; cost-benefit studies.
Statistical Analysis	Statistical theory and methodology in all areas and divers applications.
General	Initial- and boundary-value problems; combinatorial theory; group theory; numerical error sensitivity analysis; numerical solution to nonlinear partial differential equations; numerical algorithm development.
MEDICINE AND BIOLOGY	
Biochemistry	Interactions between nucleic acids, basic proteins, and energy-related toxic materials.
Cytology, Genetics and Molecular Biology	Somatic cell genetics; mutagenicity testing; cytogenetics; damage and repair; cell synchronization techniques; teratogenic systems; multiparameter cell analysis; in vivo and in vitro carcinogenicity testing; basic research in photosynthesis.
Immunology	Theoretical modeling of immune response; immunofluorescence enzyme labeled antibodies.

APPLICATION AREA	EXPERTISE
Public Health and Industrial Medicine	Epidemiological studies of plutonium workers; tissue Pu measurements; occupational health; airborne contaminants and protection.
Radiobiology	Pion radiotherapy; negative pion radiobiology with animals and cell systems; radiopharmaceutical tracers; plutonium carcinogenesis from "hot particles."
Toxicology	Acute and chronic toxicology; carcinogenesis and mutagenesis of oil-shale-associated materials.
NATURAL RESOURCES AND EARTH SCIENCES	
Geology and Geophysics	Ore genesis; geochemistry; seismology; rock mechanics; igneous geology; solid-earth geophysics; equation-of-state for geological materials; ion probe instrumentation; geophysical phenomena.
Mineral Industries	Performance of blasting agents; response of geological material to shockwaves and jets.
Natural Resource Surveys	Geothermal site selection; evaluation of geothermal reservoirs; uranium geochemical reconnaissance survey; analysis of satellite photos.
General	Atmospheric chemistry.
NAVIGATION, GUIDANCE AND CONTROL	
Control Devices and Equipment	Tracking systems for solar eclipse experiments from airborne platforms.

APPLICATION AREA	EXPERTISE
NUCLEAR SCIENCE AND TECHNOLOGY	
Fusion Devices (Thermonuclear) .	Laser fusion: experimental, theoretical, systems studies, magnetic confinement fusion: theta pinch, Z pinch, systems studies; materials; environmental impact studies; tritium technology.
Isotopes	Radioisotopes for medical applications; stable isotopes of carbon, nitrogen, oxygen and sulfur; laser isotope separation of U and Pu; radioisotopic heat sources (^{238}Pu compounds); spallation isotopes.
Nuclear Auxiliary Power Systems.	Space power reactors; design and materials technology for isotopic heat sources; radioisotopic thermoelectric generators; safety analysis and testing for space and terrestrial applications.
Nuclear Explosions and Devices .	Weapons diagnostics; testing explosive components; weapon effects; fireball chemistry; seismic detection; seismic monitoring of peaceful nuclear explosions; teleseismic verification of yield; earth electromagnetics and strain-tilt instrumentation.
Nuclear Instrumentation.	Calibration of radiation sources and instruments; design and development of a wide variety of detectors and instruments; low-energy X-ray facility; doped plastic scintillators; measurements of transuranic nuclide body burdens; environmental distribution of radionuclides.
Radiation Shielding, Protection, Safety	Reactor safety: LWR, HTGR, LMFBR safety studies; neutronics analysis; hydrodynamic analysis; facilities for handling high-level gamma radiation.

APPLICATION AREA	EXPERTISE
Radioactive Wastes and Radioactivity.	Processing, packaging, disposal and safety of transuranic wastes; radionuclide migration; laser photochemistry for waste processing.
Reactor Engineering and Nuclear Power Plants	Advanced reactor design studies: plasma core, heat-pipe cooling, very high temperature gas cooled reactor for process heat.
Reactor Fuels and Fuel Processing	Advanced LMFBR fuels; nondestructive and destructive examination of fuels; aqueous oxidation-reduction kinetics of actinide ions.
Reactor Materials.	Handling; nondestructive and destructive examination; sodium handling and bonding for LMFBR fuel.
Reactor Physics.	Neutron transport and dosimetry; generation and transmutation of isotopes; heavy ion accelerator experiments; atomic and nuclear data; cross section and polarization phenomena measurements with neutrons, protons, deuterons and tritons.
General.	Reactor Safety: Experiments on criticality safety, application of nuclear diagnostics; Safeguards: nuclear process heat and applications; plutonium technology; nuclear processes as diagnostic tools; research with 8 MW reactor, 23 MeV Van de Graaff, 800 MeV proton linac.

OCEAN TECHNOLOGY AND ENGINEERING

Dynamic Oceanography	Explosive-driven shockwaves and waterwaves, upper and lower critical depth effects, etc.

APPLICATION AREA	EXPERTISE
ORDNANCE	
Ammunition, Explosives, and Pyrotechnics	Explosives in general; explosive testing and design; insensitive explosives; initiation; hazards; shaped charges; fragmentation (especially heavy metals), modeling; qualification of explosives, containment vessels, in-bore prematures; heavy-metal penetrators.
Armor	Modeling and design, testing.
Bombs	Modeling, small scale testing, containment vessels.
Detonations, Explosive Effects and Ballistics	Detonation theory, hazards, hydrodynamic calculations, instrumentation (electrical, optical and X-ray), Hugoniots, performance, effects.
Rockets	Propellant hazards testing (SDT,DDT, etc.), hazards instrumentation, hazards modeling.
Underwater Ordnance	Explosives, shockwaves, jets, critical depth, bubble calculations.
General	Laboratory testing, new concepts.
PHOTOGRAPHY AND RECORDING DEVICES	
Photographic Techniques and Equipment	All speeds (especially ultra-high) photography (optical and X-ray); film, camera and lens design and fabrication (streak and framing); image intensifier design and fabrication, film sensitivity, densitometry, film interpretation and analysis, intense light sources, image digitization and enhancement, stereo (optical and X-ray); X-ray pinhole photography; X-ray streak cameras; infrared vidicons.

APPLICATION AREA	EXPERTISE
Recording Devices.	Design of high-speed oscilloscope and digital time recording instrumentation.
Holography	Visible and infrared laser holography.
PHYSICS	
Acoustics.	Sound speeds and attenuation applied to nondestructive testing; acousto-optic systems.
Fluid Mechanics.	Efficient computational methods, numerical hydrodynamics, multidimensional flows; multiphase flows; fluid dynamics of chemically reacting systems; turbulent flow; statistical theory of fluid turbulence; shock phenomena.
Optics and Lasers.	Infrared and ultraviolet gas and solid-state lasers, especially CO_2; new laser R&D; laser system design and alignment; coherent antistokes raman scattering; laser interaction with solids; laser isotope separation; fission-product laser pumping; micromachining of optical elements; optical damage to materials; acousto-optic systems.
Solid State Physics.	Surface and cluster theory; equation-of-state in plastic, fracture and high-pressure regions, laser-solids interaction; transport in semiconductors, liquids; electron emission; electronhole droplets; statistical theory of metals, semiconductors and insulators.
Plasma Physics	Mathematical, computational, experimental, diagnostics; laser-plasma interactions; transport properties; collective phenomena; plasma turbulence; equation-of-state; detonation plasmas; explosive-driven implosions.

APPLICATION AREA	EXPERTISE
Radio Frequency Waves.	Propagation and scattering in various media; detonation generation.
General.	Space Physics: Solar and geophysical phenomena; Accelerator Physics: All aspects; Nuclear Physics: Basic research in nuclear spectroscopy, reactions, fission process and yield; medium energy physics; high altitude physics; transport theory; quantum electrodynamics; statistical physics; theoretical molecular physics, molecular dynamics; statistical mechanics of many-body systems; phase transitions.

PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS

Energy	Socioeconomic assessments and data bases for Rocky Mountain resource utilization; cost-benefit analysis of proposed projects; methematical analysis of input-output economic-ecologic regional energy models; energy resource modeling; design and development of energy-environment simulators.
Environment.	Assessment of health and environmental effects of plutonium.
Transportation	Models for car pools, urban mass transit systems on hybrid computer.
General.	Cost-benefit analysis of proposed projects.

TRANSPORTATION

General.	Explosion hazards.

APPLICATION AREA	EXPERTISE
URBAN AND REGIONAL TECHNOLOGY AND DEVELOPMENT	
Emergency Services and Planning	Alarms and surveillance systems for plant facilities protection.

CONTACT: Dr. Eugene Stark
Los Alamos Scientific Laboratory
Los Alamos, New Mexico 87545
Telephone: (505) 667-4548
FTS: 843-4548

LBL
(Far West Region)

LAWRENCE BERKELEY LABORATORY
Berkeley, California 94720

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Inventory Control	Computerized inventory control system.
Personnel Management, Labor Relations and Manpower Studies	Manpower requirements associated with energy resources.
ASTRONOMY AND ASTROPHYSICS	
Cosmic Ray Research	Cosmic ray studies using high altitude balloons.
ATMOSPHERIC SCIENCES	
Aeronomy	Effects of pollutants on ozone supply.
BIOMEDICAL TECHNOLOGY AND HUMAN FACTORS ENGINEERING	
Biomedical Instrumentation and Bioengineering	Radiation cameras and tomographic scanners using radioisotopes; lipoprotein analyzer.
BUILDING INDUSTRY TECHNOLOGY	
Architectural Design and Environmental Engineering	Computer program for analyzing energy efficiency of existing or proposed buildings; energy efficient lighting, heating, ventilation, air conditioning systems; solar heating and cooling; heat controlling filters for windows; energy conserving window shade designs; analytical and experimental thermal analysis of passive solar design.

APPLICATION AREA	EXPERTISE
BUSINESS AND ECONOMICS	
Domestic Commerce, Marketing and Economics	Census information and urban atlases; energy-economic models, forecasts of economic impacts of various energy scenarios.
CHEMISTRY	
Industrial Chemistry and Chemical Process Engineering	Coal liquification, gasification; stack gas purification; basic studies of catalysts; biomass conversion.
Basic and Synthetic Chemistry	Inorganic/exotic compounds; Van der Waals molecules, molecular beam studies.
Photo and Radiation Chemistry	Synthesis of elements and compounds in charged particle accelerators; isotope separation; ion implantation; mesonic chemistry, chemical reactions of heavy ions.
Physical and Theoretical Chemistry	Research in catalysis; thermodynamic and electrochemical cell research; crystal structure anomalies and radiation damage; electron spin resonance and proton spin resonance studies for determining crystal structure and energy levels; mathematical analysis; molecular structure; combustion chemistry.
COMPUTERS, CONTROL AND INFORMATION THEORY	
Computer Hardware	Accessories; networks.
Computer Software	Teleprocessing; data management; graphics; management information systems; networks.

APPLICATION AREA	EXPERTISE
Control System and Control Theory	Train control; instrument and accelerator control.
Pattern Recognition	Image processing; application to data analysis.

ELECTROTECHNOLOGY

APPLICATION AREA	EXPERTISE
Optoelectronic Devices and Systems	Light emitting diodes; solar cells.
Resistive, Capacitive and Inductive Components	Superconducting magnets; printed coils, magnet design.

ENERGY

APPLICATION AREA	EXPERTISE
Energy Use, Supply and Demand	Energy budgets, economic impacts, and impact multipliers for California and Rocky Mountain region; future studies.
Fuel Conversion Processes	Coal liquification and gasification, solar cells, photosynthesis; fusion; biomass.
Policies, Regulations and Studies	Economics; legal barriers to energy conservation in buildings; nuclear materials accounting, solar ownership and marketing.
Heating and Cooling Systems	Solar heating and cooling.
Fuels	Coal liquification and gasification; cellulose to alcohol conversion; molecular structure of coal; coal combustion.
Engine Studies	Basic studies of combustion in internal combustion engines.
Solar Energy	Heating and cooling controls; air conditioning; circumsolar radiation measurements; use of photosynthesis for

APPLICATION AREA	EXPERTISE
Solar Energy (contd)	hydrogen separation and for photoelectricity; bioconversion, California solar data; improved solar cells; solar ownership and marketing; radiative and passive cooling; analysis of passive solar buildings.
Miscellaneous Energy Conversion and Storage	Nitinol engine development.
Geothermal Energy	Field survey methods; subsidence; silica precipitation; National Geothermal Information Resource; geochemistry; magma; hydrodynamics; physical in-situ properties of rocks at high temperature and pressure; thermodynamics; nonelectrical uses.
Selected Studies in Nuclear Technology	Fusion power technology; laser isotope separation; neutral beam injectors; ion sources.
Environmental Studies	Environmental aspects of power generation; water impacts of in-situ oil shale technologies; effects of pollutants on membranes.
General	Energy conservation; appropriate technology; conservation education; manpower for conservation; fire research.

ENVIRONMENTAL POLLUTION AND CONTROL

Air Pollution and Control	Air pollutants from power production; fundamental study of sulfur compound removal from stack gas; reactions in formation of aerosols; effects on plant life; instrumentation for measuring pollutants; ozone study.
Water Pollution and Control	Toxicity, fate and concentration of trace metals in marine environment; key ecosystem parameters; water impacts of in-situ oil shale technology; instrumentation for measuring pollutants.

APPLICATION AREA	EXPERTISE
Radiation Pollution and Control	Monitoring of gamma and X-rays, charged particles, neutrons; biological and environmental effects. Waste storage in granite; instrumentation.
Environmental Health and Safety	Effects of pollutants from power production on health; heavy metals effect on health; indoor air pollution; effects of radionuclides, ionizing radiation, magnetic and electric fields on health; population at risk to air pollution.
General	Survey of instruments for environmental monitoring.

GOVERNMENT INVENTIONS FOR LICENSING

Chemistry	Bioconversion, stack gas cleanup.
Nuclear Technology	Ion sources.
Biology and Medicine	Radiation cameras; radioactive tracer.
Metallurgy	New steel alloys and treatment; superconductors.
Instruments	Trace heavy metal detector.

HEALTH PLANNING

Community and Population Characteristics	Demographic information; epidemiology.
Environmental and Occupational Factors	Effects of energy production on health.
Health Care Technology	Development of an automated lipoprotein analyzer; radiation cameras and tomographic scanners; nuclear medicine, heavy ion radiation therapy.

APPLICATION AREA	EXPERTISE
INDUSTRIAL AND MECHANICAL ENGINEERING	
Environmental Engineering	Energy conserving lighting; passive light controls; solar air conditioning.
Manufacturing Processes and Materials Handling	Powder metallurgy.
LIBRARY AND INFORMATION SERVICES	
Information Systems	Networks; management information systems; data base management; indexing; automatic indexing. Retrospective and current awareness information retrieval; information system product pricing.
Reference Materials	Thesauri; thesaurus software.
MATERIALS SCIENCES	
Carbon and Graphite	Glassy carbon; study of graphite surface chemistry in combustion.
Ceramics, Refraction and Glass	Ceramic alloy research; microstructure relationship to properties; ferrites.
Corrosion and Corrosion Inhibition	Erosion-corrosion resistant alloys in coal combustion systems; erosion-corrosion test facility.
Iron and Iron Alloys	New high strength steels and heat treatment; steels for use at cryogenic temperatures; basic studies in powder metallurgy; nickel free cryogenic steels; study of fundamentals of alloy design, phase studies.
Nonferrous Metals and Alloys	New magnetostrictive material; sintered printed circuit conductors; Nitinol research and applications.

APPLICATION AREA	EXPERTISE
MATHEMATICAL SCIENCES	
Algebra and Number Theory	Theory of equations and vector spaces.
Geometry	Analysis of surfaces.
Operations Research	Mathematical programming.
Statistical Analysis	Economic statistics.
General	General usage of mathematics in statistical data analysis.
MEDICINE AND BIOLOGY	
Biochemistry	Basic studies of photosynthesis.
Clinical Chemistry	Automated lipoprotein analysis.
Clinical Medicine	Experimental treatment with heavy ions and alpha particles of acromegaly, pituitary, epilepsy, tumors, and other conditions; radiation cameras; diagnostic techniques with radionuclides; sickle cell anemia.
Cytology, Genetics and Molecular Biology	Genetic studies in yeast; cytology fine structure; genetic hazards from energy production.
Ecology	Ecosystem stability.
Electrophysiology	Action of toxic molecules on neurons.
Pathology	Studies of effects of radiation and pollutants on tissues and organs.
Public Health and Industrial Medicine	Health effects of various pollutants associated with energy use and production.
Radiobiology	Effects of electromagnetic and particle radiation on biological systems.

APPLICATION AREA	EXPERTISE
Stress Physiology	Effects of electric and magnetic fields.
NATURAL RESOURCES AND EARTH SCIENCES	
Geology and Geophysics	Geophysics associated with geothermal systems including survey methods, subsidence, evaluating reservoirs, modeling of rocks under stress; magma studies with potential geothermal applications; earthquake prediction.
Cartography	Computer production of maps showing demographic data.
NUCLEAR SCIENCE AND TECHNOLOGY	
Fusion Devices	Ion sources and neutral beam injectors; toroidal magnetic cusp confinement (TORMAC).
Isotopes	Separation and identification.
Nuclear Instrumentation	Complex detector, counter, and analyzer development.
Radiation Shielding, Protection and Safety	Shielding and protection systems for high energy charged particle accelerators.
OCEAN TECHNOLOGY AND ENGINEERING	
Biological Oceanology	Ecosystem stability indicators in estuarine environments.
General	Environmental effects of ocean thermal energy conversion processes.
PHYSICS	
Solid State Physics	Research in far-infrared spectroscopy, quantum mechanics, and superconductivity.

APPLICATION AREA	EXPERTISE
Plasma Physics	Research and development fusion energy.
General	Nuclear physics using high energy charged particle accelerators.

PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENT

Energy	Conservation, geothermal, solar; regional energy studies.
Environment	Compilation of descriptions of various commercial environmental monitoring instruments and data on various monitoring considerations; studies on effects of various pollutants.
General	Census data available; computer production of demographic maps.

TRANSPORTATION

Metropolitan Rail Transportation	Investigation of control and safety related equipment for rail rapid transit (BART).
Road Transportation	Study of electric highway transportation system.

URBAN AND REGIONAL TECHNOLOGY AND DEVELOPMENT

Economic Studies	Various studies for California and Rocky Mountain region related to employment and economic impacts of various energy scenarios.

CONTACT: Robert J. Morris
Technology Utilization Office
Lawrence Berkeley Laboratory
University of California
Building 903, Room 309
Berkeley, California 94720
Telephone: (415) 843-2740 X6502

NASA LEWIS RESEARCH CENTER
21000 Brookpark Road
Cleveland, Ohio 44135

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Research Program Administration and Technology Transfer	Management of R&D, small projects to large complex systems. Comprehensive technology transfer program.
AERONAUTICS AND AERODYNAMICS	
Aerodynamics	Aerodynamic behavior of bodies in large wind tunnels and in zero gravity.
Test Facilities and Equipment	Design and operation of vacuum, cryogenic, materials, engine, and power test facilities. Large wind tunnels and zero gravity facilities. Data collection systems.
BIOMEDICAL TECHNOLOGY AND ENGINEERING	
Prosthetics and Mechanical Organs	Advanced materials for prosthetic applications. Surface treatment of prosthetics materials with ion beams to promote tissue and bone adherence.
BUSINESS AND ECONOMICS	
Minority Enterprises	Scientific and technical careers. Minority R&D enterprises.
CHEMISTRY	
Analytical Chemistry	Instrumental analysis including mass spectroscopy, optical and x-ray emission spectroscopy, x-ray diffraction, atomic absorption, spectrophotometry, and gas, ion, and liquid chromotography. Metallographic analysis (wet chemistry).

APPLICATION AREA	EXPERTISE
Basic and Synthetic Chemistry	Synthesis, properties, and reactions of inorganic and organic compounds.
Industrial Chemistry and Chemical Process Engineering	Transportation, handling, and storage of cryogenic fluids.
Photo and Radiation Chemistry	Studies involving the interrelationships of electromagnetic or particle radiation and chemical reactions. Studies of radioactive elements and their reactions such as radio pharmaceuticals. Photovoltaic devices (solar cells).
Physical and Theoretical Chemistry	Physical aspects and interpretation of chemical systems; reaction kinetics, chemical equilibria, chemical thermodynamics, thermochemistry, etc. Electrochemistry. Phase studies of metallic systems. Membranes. Surface chemistry.

COMMUNICATION

Common Carrier and Satellite	High power, high frequency amplifiers for communications satellites. Advanced satellite communications systems.

COMPUTERS, CONTROL AND INFORMATION THEORY

Control Systems and Control Theory	Open and closed loop control systems.
Information Processing Standards	Data acquisition and reduction for test installations.

APPLICATION AREA	EXPERTISE
Fuel Conversion Process	Basic studies on heat transfer theory, principles and mechanisms. Advanced coal-fueled systems studies, once-through boiling, heat pipes, combustion process.
General	Basic studies on gas turbine, rotating and reciprocating engines and components; hydrocarbon and hydrogen fuels.
ENVIRONMENTAL POLLUTION AND CONTROL	
Air Pollution and Control	Airborne air quality and atmospheric condition monitoring systems. Some development and demonstration of advanced ground-based air quality monitoring techniques.
Noise Pollution and Control	Research on propagation and reduction of aircraft engine noise.
Radiation Pollution and Control	Radioactive contamination assessment and control.
Environmental Health and Safety	Environmental contamination assessment and control.
GOVERNMENT INVENTIONS FOR LICENSING	
General	Various, particularly as related to aircraft and spacecraft propulsion and electric power, satellite communications, and materials.
INDUSTRIAL AND MECHANICAL ENGINEERING	
Quality Control and Reliability	Standards, plans, and techniques for insuring high quality and reliability. Failure analysis and information feedback.

APPLICATION AREA	EXPERTISE
ELECTROTECHNOLOGY	
Antennas	Antenna theory and design, wide-band and narrow-band, for satellite and spacecraft communications systems.
Circuits	Circuit theory, filters, amplifiers, power conditioning and supply circuits, signal conditioning circuits, commutators, logic circuits, switching circuits, phase locked loop circuits.
Electromechanical Devices	Relays, switches.
Electron Tubes	Traveling wave tubes, Klystron tubes, thyristor tubes.
Power and Signal Transmission Devices	Satellite and spacecraft communications terminals, wideband parametric amplifiers, analog and digital transmission devices, lasers, data relay systems.
Resistive, Capacitive and Inductive Components	Capacitors, electromagnets.
Semiconductor devices	Transistors, semiconductor diodes.
ENERGY	
Energy Sources	Solar (photovoltaic), wind (large systems).
Miscellaneous Energy Conversion and Storage	Gas turbine and compressors, topping cycles, Rankine, Brayton, and Stirling cycle engine systems, magnetohydrodynamic generation; solar photovoltaic; large wind power systems; high energy density batteries; fuel cells; reduction-oxidation (redox) storage systems.
Energy Transmission	Superconducting materials.

APPLICATION AREA	EXPERTISE
Tooling, Machinery and Tools	Gas turbines, compressors, pumps, gears, bearings, seals, pressure vessels, advanced materials. Lubrication, friction, and wear.
Manufacturing Processes and Materials Handling	Advanced materials application and fabrication. Handling and storage of cryogenic fluids, hydrogen, fuel and oxidizers. Sputtering and ion plating.
Nondestructive Testing	Ultrasonic, radiographic, and other means for nondestructive evaluation. Electronic and optical systems for internal inspection of operating machinery.

MATERIALS SCIENCES

Ceramics, Refractories and Glass	Basic studies of ceramic materials for very high temperature applications.
Composite Materials	Comprehensive research and development on essentially all classes of composite materials, their properties, characteristics, and applications.
Corrosion and Corrosion Inhibition	Research on high temperature environment corrosion and corrosion inhibiting coatings, high temperature oxidation and oxidation resistant coatings.
Iron and Iron Alloys	Basic studies of physical properties to extend uses at cryogenic temperature.
Lubricants and Hydraulic Fluids	Research and development of advanced lubricants and hydraulic fluids for severe operating conditions and long life.

APPLICATION AREA	EXPERTISE
Nonferrous Metals and Alloys	Research and development for high temperature and gas turbine applications. Superalloys. Dispersion strengthened materials. Eutectics.
Plastics	(see Polymer Chemistry)
Refractory Metals and Alloys	Research on microstructure, physical and mechanical properties, alloying for high temperature use. Improvement in fabrication properties and processes.

MEDICINE AND BIOLOGY

Radiobiology	Preparation of experimental radioactive isotopes for diagnosis and treatment of diseases for U.S. Public Health Service.

NATURAL RESOURCES

Natural Resource Surveys	Airborne multispectral scanning to determine earth surface conditions.
Snow, Ice, and Permafrost	Aircraft and satellite-borne sensor systems to determine the thickness and kinds of ice covering large bodies of water.

PHOTOGRAPHY AND RECORDING DEVICES

Holography	Development of holography techniques.
Photographic Techniques and Equipment	Development of high-speed motion picture systems and other techniques for photographing research work.

APPLICATION AREA	EXPERTISE
PHYSICS	
Acoustics	Research on the nature, properties, propagation, and suppression of sound in ducts. Applications to aircraft engines.
Fluid Mechanics	Research and applications of fluid properties, and static and dynamic behavior; and of interactions between fluids and solid bodies.
Optics and Lasers	Research on lasers, and applications of fiber optics and other optical devices for instrumentation and data-taking purposes.
Solid State Physics	Research on physical properties of materials particularly as related to magnetism and superconductivity. Semiconductor studies particularly as related to photovoltaic devices.
Structural Mechanics	Stress analysis, shock and vibration research, particularly as related to properties of advanced materials and rotating machinery. Fracture mechanics. Fatigue failure mechanisms.
Plasma Physics	High temperature plasma research for advanced power and propulsion systems.
ROBLEM SOLVING INFORMATION OR STATE AND LOCAL GOVERNMENTS	
Energy	Airborne thermal imaging of ground facilities to identify places of heat loss.
Environment	Techniques for identifying airborne contaminants and locating their sources.

APPLICATION AREA	EXPERTISE
TRANSPORTATION	
Surface Transportation.	Electric vehicle studies and power plant development. Automotive gas turbine and Stirling-cycle engines. Technology for increasing fuel efficiency and reducing exhaust emissions.

CONTACT: Paul Foster
Technology Utilization Officer
NASA Lewis Research Center
21000 Brookpark Road
Cleveland, Ohio 44135
Telephone: (216) 433-4000, ext 6832

LAWRENCE LIVERMORE LABORATORY
Livermore, California 94550

APPLICATION AREA	EXPERTISE
ADMINISTRATION	Human resource data base development; technology transfer and training program.
ASTRONOMY AND ASTROPHYSICS	Physical property measurements of terrestrial and extraterrestrial rocks and minerals at high temperatures and pressures; soft X-ray instrumentation analytical and computer modeling; rocket astronomy.
ATMOSPHERIC SCIENCES	Instrumentation; regional air quality modeling; analytical and computer modeling site surveys; satellite ozone analysis and radiative transfer computations.
BEHAVIOR AND SOCIETY	Technology transfer training program, continuing education program and career development program.
BIOMEDICAL TECHNOLOGY AND HUMAN FACTORS	Chromosome analysis measurement and sorting techniques; computer automation for biomedical research.
CHEMISTRY	Electron paramagnetic resonance spectroscopy; scanning electron microscopy; nuclear magnetic resonance spectroscopy; gas chromatography; X-ray diffraction; polography; electrochemistry; automated analysis; thermochemistry; in situ coal gasification studies; shale oil retorting studies; laser isotope separation; particulate analysis; surface chemistry.
CIVIL ENGINEERING	P-V relationships of rocks and minerals; scanning electron microscopy; fracturing; modeling of coal mine pillar structures; earthquake-proof design.

APPLICATION AREA	EXPERTISE
COMMUNICATION	Stability of coders for industrial television; industrial television monitor display systems; use of microcomputers in communication theory; laser communication systems.
COMPUTERS, CONTROL AND INFORMATION THEORY	Programming, data base acquisition and retrieval systems; pattern recognition techniques; interactive graphics; pattern recognition techniques.
DETECTION AND COUNTERMEASURES	Systems analysis and modeling of explosive detection and countermeasure techniques.
ELECTROTECHNOLOGY	Computer modeling and electromagnetic analysis of antenna design; inspection of IC photomasks; electro-optical scanner for monitoring electron beam welds; design of ultrafast Pockels cell devices and modulators; high power laser amplifiers; high power laser systems; semiconductor detector fabrication techniques and evaluation studies; design of microcircuits and unique chips; photovoltaic cells applications.
ENERGY	Planning, forecasting, and resource assessment studies; high power laser fusion; magnetic fusion R&D; biofuel production schemes; solar heating and cooling studies; alternative fuels and alternative engine evaluation; transportation modeling; geothermal energy R&D; in situ coal gasification; oil-shale retorting; photovoltaic materials development.
ENVIRONMENTAL POLLUTION AND CONTROL	Trace element detection and analysis; techniques for detecting and analyzing mutagens and carcinogens; particulate detection and analysis; air quality modeling studies; meteorological data acquisition; instrumentation and systems development; stack monitoring.

APPLICATION AREA	EXPERTISE
INDUSTRIAL AND MECHANICAL ENGINEERING	Metric conversion planning, precision machining and polishing; non-destructive testing of microtargets for laser fusion; acoustic emission for nondestructive testing applications.
LIBRARY AND INFORMATION SERVICES	Novel techniques for information storage and rapid retrieval systems; master control computer program; on-line literature searching; computer program for integrating tests and data.
MATERIALS SCIENCES	Development of metals and alloys having special properties; fabrication of specialized ceramic components; synthesis, formulation and characterization of polymers and fiber composites; synthesis, formulation, processing, machining; processing and fabrication of beryllium glasses; storage behavior of hydrogen and its isotopes under extremes of pressure and temperature and solid state chemistry; new materials and fabrication processed by vapor deposition techniques; coatings, structures and electronic devices by thin-film technology; electroplating and electroforming of shapes and materials; crystal growth of large silicon and germanium crystals; joining technology; physical and mechanical testing at the extremes of temperature and pressure; surface microstructure analysis; equation-of-state studies; radiation effects on structural materials; fabrication of amorphous alloy glass components.
MATHEMATICAL SCIENCES	Sensitivity analysis of ordinary differential equation systems subroutines to evaluate mathematical functions; applied and computational mathematics; computer algorithms for transposing large matrices.

APPLICATION AREA	EXPERTISE
MEDICINE AND BIOLOGY	Screening of chemotherapeutic agents using pattern recognition techniques; biological effects of nuclear explosions.
NATURAL RESOURCES AND EARTH SCIENCES	Seismic analysis of resistant structures and power reactors; seismic detection and instrumentation; in situ coal gasification; shale oil retorting.
NUCLEAR SCIENCE AND TECHNOLOGY	Energy level computations and measurements; nuclear electric moments; gigajoule laser technology; management of nuclear wastes.
PHOTOGRAPHY	Optics of ultra-high-speed photography; picosecond photography of laser produced plasmas; ultrafast optical/X-ray framing camera; high voltage photography, industrial photography.
PHYSICS	Computations; geophysical investigations of terrestrial material properties; geophysical instrumentation and measurements.
PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS	Fire-arson and disaster control planning; fire hydraulic; residential and industrial fire protection studies; fire protection equipment development - streams, nozzles, hydrants, hydraulic hardware; State and local government assistance in energy planning and analysis; technology transfer to State and local governments; transportation modeling of street and highway systems.

CONTACT:
R. Carroll Maninger
Lawrence Livermore Laboratory
University of California
P.O. Box 808 - L790
Livermore, California 94550
Telephone: (415) 422-6902

MEDICAL DEVICES LABORATORY
Silver Spring, Maryland 20910

APPLICATION AREA	EXPERTISE
BIOMEDICAL TECHNOLOGY AND HUMAN FACTORS ENGINEERING	
Prosthetics and Mechanical Organs	Performance Standards and Test Methods evaluation and development for metallic and polymeric implant devices.
Biomedical Instrumentation and Bioengineering	Performance Standards and Test Methods evaluation and development for Diagnostic, Therapeutic and Surgical devices.
HEALTH PLANNING	
Legislation and Regulations	Federal Regulatory requirements for Medical Devices and Diagnostic Products.
MEDICINE AND BIOLOGY	
Clinical Chemistry	Performance Standards and Test Methods evaluation and development for Clinical Chemistry products using spectrophotometry, flame photometry, atomic absorption (Flame and graphite furnace), Spectrophotometry electrophoresis, osmometry, chloridometry.
Immunology	Performance Standards, Test and evaluation of diagnostic immunologic products using radioimmunassay (gamma), electrophoresis, immunoelectrophoresis, immunodiffusion, fluorescent antibody measurements, complement fixation and agglutination reactions.

APPLICATION AREA	EXPERTISE
Hematology	Performance Standards, test development and evaluation of hematology products using blood cell count and indices, cell morphology, and differentials, platelet counts (microscopy), fibrometer determination of coagulation parameters such as prothrombin time (PT) and partial thromboplastin time (PPT).
Microbiology	Performance Standards and Test Methods development and evaluation for microbiologic and tissue culture media, antibiotic sensitivity testing, sterility.

CONTACT:
Edward Mueller
Food and Drug Administration
Medical Devices Laboratory
8757 Georgia Avenue
Silver Spring, MD 20910
Telephone: (202) 447-2468

MOBILITY EQUIPMENT RESEARCH AND DEVELOPMENT COMMAND
Fort Belvoir, Virginia 22060

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Research Program Administration and Technology Transfer. . . .	Research and development planning and management; contract management; identification of technical problem areas and research needs; Technology Transfer.
BUILDING INDUSTRY TECHNOLOGY	
Structural Analysis.	Test and evaluation of structural integrity and load carrying capability of bridges, prefabricated buildings, towers and ancillary equipment. Dynamic and static data acquisition and conversion to practical engineering information. Mobil Stress Analysis Van; A/D Strain Data Input Control and Recording System accomodates up to 250 data channels and enables instant on-the-site-data analysis and print-out. Portable data acquisition systems also available.
Construction Materials, Components and Equipment . . .	Environmental equipment technology and total environmental control systems for mobile shelters and vans. Industrial wastewater renovation; water treatment and pollution control technology; general purpose lighting, high power search lights.
CHEMISTRY	
Analytical Chemistry	Chemical analyses of metals, glasses, organic and inorganic materials. Emission Spectrometer/Spectrophotometers, Scanning Electron Microscope, Particle Counters, Gas Chromatograph, Liquid Chromatograph, etc.

APPLICATION AREA	EXPERTISE
Polymer Chemistry	Polymer research and development includes pressure polymerization and Ziegler Catalysis; characterization of polymers by molecular weight, chemical, physical and electrical properties.
Physical and Theoretical Chemistry	Research in electrochemistry using gas chromatograph-mass spectrometer tandem unit; surface research on phenomena such as catalysis and corrosion by low energy electron diffraction (LEE), reflecting high energy electron diffraction, secondary electron spectroscopy and mass spectrometry; trace gas detection technology emphasizing plasma chromatography and enzymatic methods.
CIVIL ENGINEERING	
Civil Engineering	Water and waste management and pollution abatement. Complete chemical, physical, radiological and bacteriological analyses. Specialized equipment for the evaluation of waver purification systems including the effectiveness of reverse osmosis and ultrafiltration membranes. Outdoor testing of water purification and sewage treatment systems; sewage treatment for crane barge.
Construction Equipment, Materials and Supplies	Specification and evaluation of construction, earthmoving, clearing and highway maintenance equipment. Extensive test facilities including high speed operations; vehicle road endurance; service brake tests; vehicle drawbar and drag test, drive-by sound level measurement; cross-country stability tests, hydraulic components test, etc. A special "wading pond" is designed to provide water at controlled depth up to 6 feet. State-of-the-art equipment for measuring and analyzing exhaust emissions.

APPLICATION AREA	EXPERTISE
COMPUTERS, CONTROL AND INFORMATION THEORY	
Computer Software	Programming.
DETECTION AND COUNTERMEASURES	
Acoustic Detection	Intrusion detection; noise monitoring.
Infrared and Ultraviolet Detection	Intrusion detection by: passive scanning IR and passive IR motion sensors.
Magnetic Detection	Active and passive techniques for intrusion and metal detection applications.
Personnel Detection	Intrusion detection by acoustic, seismic, magnetic, electromagnetic and optical devices. Fully integrated systems featuring remote monitoring and interrogation.
Radio Frequency Detection	Soil penetrating radars; microwave detectors of subsoil features; tunnel detection; non-linear radar for special applications. In-door facility for radar cross section and imaging measurements.
Seismic Detection	Detection and classification of intruders.
ELECTROTECHNOLOGY	
Antennas	Design/evaluation of special purpose antennas; interactive computer program for pattern calculations; anechoic chamber (200 MHz and higher).
Circuits	Microwave network analyzer, microprocessor test and analysis facility; microcomputer programming and hardware development. Customized electric power supplies power conditioners; Thyristor test facility; CAD-E skills and computer facilities.

APPLICATION AREA	EXPERTISE
Electromechanical Devices. . . .	Electric generators and propulsion systems.
Power and Signal Transmission Devices.	Electric power transmission and distribution for quick reaction field applications.
Semiconductor Devices.	Cooling of high power semiconductors by heat pipe technique. Advantageous for applications in electrochemical plating and metals refining; induction heating; power conditioning, motor speed controls; vehicular drives; welding controls.
General.	Lighting technology/equipment.

ENERGY

Electric Power Transmission. . .	Electric power transmission and distribution for quick reaction applications such as construction sites, airfield, emergencies, etc.
Fuel Conversion Processes. . . .	Conversion of crude oil to emergency fuel for compression-ignition engines; generation of hydrogen from hydrocarbons.
Electric Power Production. . . .	Solar Photovoltaic applications; fuel cells, batteries, electric generators.
Heating and Cooling Systems. . .	Solar heating; air conditioner power by engine exhaust gases.
Fuels.	Alternate fuels and lubricants for internal combustion engines; long life engine oils; re-refined engine oils.
Engine Studies (Energy Related)	Gas turbine technology for power range of 10 to 250 kW. See also under "Fuels" above. Internal combustion engine technology.

APPLICATION AREA	EXPERTISE
Batteries and Components	Evaluation of new battery systems for propulsion systems; development of fuel cell technology; hybrid fuel cell/battery power sources.
Solar Energy	Solar photovoltaic and thermal energy sources. Application studies.
Miscellaneous Energy Conversion and Storage	Energy storage flywheels; electric drivers; solid state power conditioners and components; electrothermal energy conversion.

ENVIRONMENTAL POLLUTION AND CONTROL

Air Pollution and Control	Analysis of exhaust gas emissions from all types of fuel burning equipment. Establishment of pollutant levels and evaluation of pollution control devices and techniques. See also "Radiation Pollution Control".
Noise Pollution and Control	Drive-by sound level measurement; simulated free field sound chamber to eliminate fluctuating ambient noise levels. Retrofit noise abatement kits for mobile construction, materials handling and power generation equipment. Expertise in the identification of noise source.
Water Pollution and Control	Water purification/desalination; complete chemical, physical, radiological and bacteriological analyses; reverse osmosis and ultrafiltration membranes. Outdoor testing of water purification and sewage treatment systems.
Radiation Pollution Control	Complete radioactive analysis, including alpha, beta, gamma, X-ray and neutron measurements. Airborne concentrations are measured directly or via particulate collection.

APPLICATION AREA	EXPERTISE
GOVERNMENT INVENTIONS FOR LICENSING	
General	Requests for license under patents should be addressed to: Chief, Patents Division, Office of the Judge Advocate General, Department of the Army, Washington, DC 20310. Requests should be submitted together with the proposed terms of the license.
INDUSTRIAL AND MECHANICAL ENGINEERING	
Quality Control and Reliability	Simulated environments; shock, vibration and road tests; electromagnetic interference evaluation; quality control of soldered connections; mobile dynometer analysis (reserve tractive effort); reliability, maintainability and quality engineering. Weld procedures and certification. Technical review of materials specifications.
Tooling, Machinery and Tools	Materials Handling Equipment (MHE) such as cargo containers; airfilm loading systems; safety devices for MHE; forklift trucks; container identification and control systems; refrigerated containers. Design of packaging systems. Air conditioning, heating and lighting.
Industrial Safety Engineering	Load indicating device systems for cranes, rollover protective structures. Health physics radiation protection (lasers, X-rays, radioactive materials, microwaves).
Hydraulic and Pneumatic Equipment	Development of specifications; state-of-the-art consulting; noise reduction; contaminant sensitivity evaluation; hydraulic system tests; fire resistant hydraulic fluids.

APPLICATION AREA	EXPERTISE
Nondestructive Testing	Nondestructive testing of metallic materials; X-ray, hardness, magnetic particle and dye penetrant.
MATERIALS SCIENCE	
Ceramics, Refractories and Glass	Ceramic products analysis
Coatings, Colorants and Finishes	Electroplated coatings; anodizing; conversion coating; research and development of paints and coatings to meet special performance characteristics; chemical analyses of paints and coatings; cleaners and paint removers; coatings for fabrics; spectral and specular reflectance measurements.
Composite Materials	Test, evaluation and development of composite materials including intercalated graphite compounds.
Corrosion and Corrosion Inhibition	Corrosion studies of metals and alloys. Consulting services in general metallurgy, welding, foundry, corrosion metals and alloy selection, failure analysis.
Elastomers	Compound development for rubber items; mechanical and physical testing of rubber, coated fabrics and adhesives; chemical and environmental evaluation; processing and fabrication of rubber prototypes. Conformance testing to ASTM, SAE and Federal specifications.
Fibers and Textiles	Mechanical and physical testing of fibers and textiles. Flammability studies, color, spectral and specular reflectance properties.
Lubricants and Hydraulic Fluids	Analysis and evaluation of fuels, lubricants, power transmission and hydraulic fluids, corrosion preventives and specialty compounds. Flame/fire resistant additives.

APPLICATION AREA	EXPERTISE
Materials Degradation and Fouling	Expertise in reverse osmosis and ultrafiltration membrane technology; identification of fungal infiltration; investigation of environmental and biodeterioration of materials; tropical chamber tests; failure analyses of metallic materials.
Solvents, Cleaners and Abrasives	Chemical cleaners and paint removers.
Wood and Paper Products	Paper technology; preparation of paper, test and evaluation.

PHYSICS

Acoustics	Transmission of sound through enclosures and through the soil; geophones; signature analysis.
Structural Mechanics	Mechanical testing; tension and compression, impact, fatigue and creep. (See also "Building Industry Technology Structural Analysis".)
Radio Frequency Waves	Near field antennas; radiation into the ground; radar scattering cross-section measurements.
General	Professional expertise available for consultation in variety of specialized fields.

PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS

Police, Fire, and Emergency Services	Physical security systems design and evaluation (exterior and interior); security system site survey; detection of explosives, mail bombs, buried objects, underground tunnels and caves. POL identification kit to provide for rapid determination if suspected fuel has been stolen.

APPLICATION AREA	EXPERTISE
Energy	Energy programs related to private sector use. (Details under "Energy" above.)
Environment	Water treatment and waste water renovation; pollution control technology involving air, water, noise and radiation. For details refer to "Environmental Pollution and Control" above.
Transportation	Dynamic testing of railway cars; computer modeling of beach mobility of construction equipment; amphibian and air cushion vehicle technology; marine propulsion systems; bridge design; multi-purpose cargo containers and container identification systems.

TRANSPORTATION

Transportation Safety	Rollover protective device design; load indicating device systems for cranes.
Pipeline Transportation	Liquid fuels handling technology, including pipeline construction technology, materials, joining techniques, fuel decontamination and fuel dispensing equipment as well as fuel additives to reduce pipeline friction. POL identification kit.
Marine and Waterway Transportation	Coastal shipping, docking/undocking large ships in harbors and ship-to-shore lighters for the transfer of cargo to the beach; amphibian and air cushion vehicle technology; bridge design; bridge launching and retrieving mechanisms; marine electronics communication and navigation/self-contained underwater breathing (SCUBA) equipment.
Railroad Transportation	State-of-the-art improvements on existing railway equipment; development of special purpose cars such as a 300 ton heavy duty flat car with hydraulic high impact cushioning.

APPLICATION AREA	EXPERTISE
URBAN AND REGIONAL TECHNOLOGY DEVELOPMENT	
Environmental Management and Planning	Refer to corresponding paragraphs under "Problem Solving Information for State and Local Governments".
Fire Services, Law Enforcement and Criminal Justice	Refer to corresponding paragraphs under "Problem Solving Information for State and Local Governments".

CONTACT:
Dr. Karl H. Steinbach
U.S. Army Mobility Equipment R&D Command
ATTN: DRDME-ZK
Fort Belvoir, VA 22060
Telephone: (703) 664-4970/3330
Autovon: 354-4970/3330

NAVAL AIR DEVELOPMENT CENTER
Warminster, Pennsylvania

APPLICATION AREA	EXPERTISE
ADMINISTRATIVE	
Management Information Systems.	PTS (Project Tracking System) implemented for major systems projects.
Personnel Management, Labor Relations and Manpower Studies.	Personnel evaluation resource and workload analysis, project management training source.
Research Program Administration and Technology Transfer. . . .	R&D administration, technology transfer program.
AERONAUTICS AND AERODYNAMICS	
Aerodynamics	Aerodynamic forces and movements, airloads, air vehicle performance, store separation, aerodynamics research. Analysis of performance, stability, aerodynamic loads. Aerothermodynamics, structures including finite element analysis.
Aeronautics.	Flight testing. Fatigue life assessment of all Navy fighter A/C. Flight and ground load surveys - equipment and instrumentation. Aircraft flight control and instrumentation systems. Installation, design, engineering shops. Flight dynamics, stability and control, flying qualities, simulation, exploratory development. Aircraft modification certification, quality control, flight safety inspection.
Aircraft	Conceptual design, configuration trades and optimization, sensitivity to mission and payload, propulsion-induced forces and moments. Full scale structural test facility for static and fatigue tests of complete

APPLICATION AREA	EXPERTISE
Aircraft (Contd)	airframe including instrumentation loading equipment and closed loop automatic controls. Vibration, shock and environmental fatigue test facility. Preliminary design. Advanced aircraft concept formulation studies and analyses.
Parachutes and Decelerators. . .	Management control of R and D; casualty investigation as applied to ASW expendables sonobuoys, BT. Wts. 8 pounds to 600 pounds. Design, theory and testing of deployable aerodynamic decelerators.
Avionics	System integration, aircraft integration. Displays, computers, system integration design and development. Circuit design, black box development/system design. System design, avionics subsystem integration. Basic avionics technology development.
Test Facilities and Equipment.	Environmental test facilities Oreland Deep Water Facility for test of Acoustic Transducers Tank facilities and transducer test facilities at NADC. Outdoor antenna range, anechoic chambers.

ASTRONOMY AND ASTROPHYSICS

Astrophysics	Centrifuge simulation of human tolerance and performance under space vehicle acceleration and deceleration for NASA.

ATMOSPHERIC SCIENCES

Meteorological Data Collection, Analysis, and Weather Forecasting.	Meteorological and refraction sondes and related data processing.

APPLICATION AREA	EXPERTISE
BEHAVIOR AND SOCIETY	
Job Training and Career Development	In-service education by job-rotation assignments and specialized short/long-term complementary education and technical/managerial training. Integrated program development through extended time/performance monitoring and managerial assessment for optimum selection of candidates.
Psychology	Military/industrial applications through research, design, development and evaluation of aviation-oriented man-machine systems.
BIOMEDICAL TECHNOLOGY AND HUMAN FACTORS	
Human Factors Engineering	Systems approach to selection and training of personnel for operation and maintenance of equipment of systems. Operator-oriented design of equipment and work spaces, design of cockpits. Technologies for operator task-loading assessment and evaluation in complex man-machine systems, including computer modeling and simulation.
Life Support Systems	Protection for aviators against normal and induced hazards throughout mission profile; oxygen breathing systems; restraint systems including crash activated inflatable restraints; crashworthy energy absorbing/dissipating seating; protective helmets and communication systems; personal and group emergency flotation systems, fire-resistant uniforms and habiliments high-acceleration tolerance systems, ejection-seating systems; survival, detection and acquisition systems for the post-emergency environment sequence; advanced design concepts for

APPLICATION AREA	EXPERTISE
Life Support Systems (Contd)	emerging and future high-performance vehicles; protection systems for crews and troops in high-performance amphibious craft. In-house research design, development and test facilities; dynamic flight simulation in world's most advanced human centrifuge.
CHEMISTRY	
Analytical Chemistry	Complete facilities for instrumental and wet chemical analyses of engineering materials.
Polymer Chemistry	Elastomeric compounding.
Photo and Radiation Chemistry	Radio tracer chemical analysis.
General	General chemical laboratory facilities.
COMMUNICATION	
Common Carrier and Satellite	Design, development, test and application of aircraft. Radio communications equipment and systems.
Graphics	Via instrumentation display design.
Verbal	Via helmet systems.
Communication and Information Theory	Design, development, test and application of aircraft. Radio communications equipment and systems.
General	Design, development, test and application of aircraft. Radio communications equipment and systems.
COMPUTERS, CONTROL AND INFORMATION THEORY	
Computer Hardware	Aircraft computer design/integration; sub-system computer design for signal processing applications. Design, development, test and evaluation.

APPLICATION AREA	EXPERTISE
Computer Software	Design, development, test and evaluation. Application Programming, systems programming, Data Base Design Software design for large-scale system control applications; subsystem soft-ware/firmware design/integration. Soft-ware life-cycle support for a variety of operational aircraft.
Control Systems and Control Theory	Automatic stabilization systems. Flight control systems.
General	Dynamic simulation of aircraft and other vehicular environments via human centrifuge, etc.
DETECTION AND COUNTERMEASURES	
Acoustic Detection	Acoustic signal data processing; computer algorithm development; acoustic intelligence gathering Design and development of Naval acoustic detection systems both active and passive. Experience in both under water and air acoustic detection systems. Acoustic sensors, ocean measurements, modeling, analysis sonobuoy systems.
Electromagnetic and Acoustic Countermeasures	Circuit design, black box development/system design. ECM, Airborne ASW tactics. Acoustic sensors, ocean measurements, modeling, analysis sonobuoy systems. Aircraft radar cross-section reduction.
Infrared and Ultraviolet Detection	Development of infrared imaging devices. Development of aerial infrared flash systems.
Magnetic Detection	Development of airborne magnetometers for submarine detection.

APPLICATION AREA	EXPERTISE
Optical Detection	Development of lasar radar. Development of long focal length lens systems.
Personnel Detection	Infrared intrusion alarm. Seismic detector. Television base perimeter defense.
Radio Frequency Detection	Radar systems design. Passive systems design.
General	Non-acoustic detection of submarines.
ELECTROTECHNOLOGY	
Antennas	Applications for command control and telemetry. Design, theory, and on-aircraft pattern predictions, etc.
Circuits	Analysis, design. Theory and analysis. Analysis and design for displays, controls and processing.
Electromechanical Devices	Antenna and Rotodome engineering. Hydromechanical branch designs and develops devices required for use in airborne acoustic systems. Design, theory and application.
Optoelectronic Devices and Systems	Development of airborne infrared line scanners, forward looking infrared (FLIR) devices, low light level television, active range gated television, image intensifiers, charge transfer devices. Development of lens environmental compensation system.
ENERGY	
Energy Use, Supply and Demand	Collects and analyzes data on fuel use by Naval aircraft. Selects certain Navy aircraft for fuel conservation studies.

APPLICATION AREA	EXPERTISE
Electric Power Production	Aircraft power generation, control and distribution.
Fuels	Plans in conjunction with NAPTC programs to obtain aircraft fuels from alternate crude oils, tar sands, coal and oil shale.
Engine Studies (Energy Related)	Gas turbine engine performance, engine installation (inlets, diffusers, nozzles), simulation, augmentors.
Batteries and Components	Aircraft Batteries. Battery Power sources required for expendable ASW system components.
General	Conducts studies on the application of technologies to Naval aircraft to bring about fuel conservation. Conducts analysis of competing future aircraft candidates to determine relative energy/fuel use. Infrared (thermal) mapping of urban areas to detect heat losses from buildings.

ENVIRONMENTAL POLLUTION AND CONTROL

Water Pollution and Control	Use of airborne infrared line scanner to detect stream pollutants. Ion exchange systems, reclamation of solvents and paint strippers. Design and development of integrated airborne sensor systems.
Environmental Health and Safety	OBOGS (On-board oxygen generation systems) for aircraft from ambient atmosphere.
General	Non-polluting cleaners and plating baths.

APPLICATION AREA	EXPERTISE
GOVERNMENT INVENTIONS FOR LICENSING	
Mechanical Devices and Equipment	Miniboats-replacement for one-man life rafts, smaller stored weight and volume, more stable in wind and sea, for open-water survival and recreation. Electro-Servo anti-g valves-optimum response to acceleration forces.
HEALTH PLANNING	
Environmental and Occupational Factors	In aircraft and other high-stress vehicles, also high stress areas in ship-board control centers.
INDUSTRIAL AND MECHANICAL ENGINEERING	
Job Environment	In aircraft and other high-stress vehicles including amphibious landing craft.
Environmental Engineering	In cockpits, ASW data processing centers, etc.
Industrial Safety Engineering	For aircraft.
Hydraulic and Pneumatic Equipment	Aircraft hydraulic power systems, actuation systems, contamination control, hydraulic diagnostics.
Nondestructive Testing	Acoustic emission, ultrasonic, eddy current, etc.
General	Plain airframe bearings.
LIBRARY AND INFORMATION SCIENCES	
Information Systems	Computer and library information systems such as National Technical Information System, Defense

APPLICATION AREA	EXPERTISE
Information Systems (Contd)	Documentation Center, Smithsonian Science Information Exchange, Federal Assistance Program Retrieval System.
Reference Material	Library.
MATERIALS SCIENCES	
Adhesives and Sealants	Aircraft structural adhesives, structural and fuel tank sealants.
Coatings, Colorants, and Finishes	Aircraft coatings - metallic, organic, intumescent and countermeasure coatings.
Composite Materials	Organic matrix, metal matrix and high temperatures. Testing to determine data base and environmental effects. Environmental effects data base and NDT of G/E laminates design of composite aircraft primary structure (wings and fuselage). Laminate analysis. Orthotropic finite element stress, vibration, aeroelastic analysis.
Corrosion and Corrosion Inhibition	Atmospheric corrosion inhibitors and preservative compounds for airframe and avionics. Vapor phase inhibitors. Corrosion and embrittlement research. Corrosion and embrittlement detection methods.
Elastomers	Airframe and fuel cell sealants, sealants for missiles and sonobuoys.
Fibers and Textiles	Materials for LTA (lighter than air) vehicles.
Lubricants and Hydraulic Fluids	Solid lubricants, fire resistants, hydraulic fluids, tribology.

APPLICATION AREA	EXPERTISE
Materials Degradation and Fouling	Data base for graphite-epoxy composite degradation in aircraft environments. Theory and prevention of aging of organic compounds and coatings.
Miscellaneous Materials	Standardization, major systems program support, quality assurance, Failure analysis. Coating material.
Plastics	Organic matrix structural laminates. Radome and leading edge designs.
Refractory Metals and Alloys	Coatings and directional solidification of eutectic alloys.
Solvents, Cleaners, and Abrasives	Aircraft maintenance and operational chemicals, testing procedures and application techniques. New cleaners and paint removers for organic matrix composites.
General	Packaging, potting compounds, sputter coatings for erosion, oxidation, sulfidation control and fretting sulfidation.
Iron and Iron Alloys	Fatigue, fracture, crack growth.

MATHEMATICAL SCIENCIES

APPLICATION AREA	EXPERTISE
Analysis (Mathematics)	Complex variables, Fourier Analysis. Functional Analysis. Fourier analysis, catastrophe theory.
Operations Research	Modeling, computer simulation.
Statistical Analysis	Analysis of variance, regression, significance testing.

MEDICINE AND BIOLOGY

APPLICATION AREA	EXPERTISE
Biochemistry	Objective application of biochemistry to personnel subjected to severe stresses, including exposure to

APPLICATION AREA	EXPERTISE
Biochemistry (contd)	acceleration, via analysis of blood and urine for unique fractions quantitatively correlatable with exhaustion of human adaptive mechanisms and onset of pathology.
Cytology, Genetics, and Molecular Biology.	Identification of physical, chemical, and in-vitro enzymatic properties of products of degenerated mitochondria in urine. Correlation of properties of identified fractions with those of PGB_x. Extension of in-vitro effort to in-vivo pathology to dramatically enhance monkey survival from myocardial infraction and recovery of rabbits from acute cerebral ischemia induced by arterial deprivation. Establishment of rational theory for the use of drug PGB_x in replacement therapy for ischemic cellular damage in heart and brain.
Psychophysiology	Studies of effects of stressors in inducing disorientation, the effects of task overload, personnel ability to track targets under acceleration, vibration and other combined stressors.
Physiology	See under "Stress Physiology".
Radiobiology	Use of isotopes as tracers in molecular biology.
Stress Physiology.	Studies of tolerance and performance of subjects exposed to acceleration and combined stresses on the human centrifuge. Definitions of mechanisms of debilitating stress to establish an objective index of stress proximity to intolerance and to institute protective measures for enhancing combat performance and survivability.

APPLICATION AREA	EXPERTISE
NAVIGATION, GUIDANCE, AND CONTROL	
Control Devices and Equipment. .	Human factors. Command guidance.
Guidance Systems	Human Factors. Design and develop inertial units for Guidance Systems.
Navigation and Guidance System Components	Design and develop all components for surface, subsurface and airborne platforms.
Navigation systems	Design and develop all surface, subsurface and airborne systems.
NUCLEAR SCIENCE AND TECHNOLOGY	
Isotopes	Use as tracers in biochemistry and molecular biology. Radiotracer permeation studies.
OCEAN TECHNOLOGY AND ENGINEERING	
Physical and Chemical Oceanography	Passive infrared (thermal) mapping and infrared radiometry.
Marine Geophysics and Geology. .	Analysis and measurement of gravity and magnetic fields.
Oceanographic Vessels, Instruments and Platforms. . .	Design and develop Navigation and Control Subsystems. Laser bottom profiles. Laser wave slope measuring device.
ORDNANCE	
Fire Control and Bombing System	Weapons suspension and release equipment and aircraft integration.
PHOTOGRAPHY AND RECORDING DEVICES	
Holography	Holographic display systems.

APPLICATION AREA	EXPERTISE
Photographic Techniques and Equipment	Development test and evaluation of airborne camera systems including long focal length optics, auto and range focusing systems, data annotation systems, panoramic and line scan system. Development of automated camera test equipment. Evaluation of silver halide and unconventional photographic technology.
Recording Devices	Development of acoustic and video recording devices. Aerial photography. Development of laser records.
General	Photo image enhancement techniques.
PHYSICS	
Acoustics	Design and development of underwater acoustic systems. Ocean parameters as applied to acoustic sensors.
Fluid Mechanics	Three-dimensioned, compressible, unsteady aerodynamics for Structural Airloads and Flutter analysis - Potential flow, Mach Box, Doublet Latter and Piston Theory. As applied to proper operation of systems being developed. Aircraft fluidic components and systems.
Optics and Lasers	Ring Laser Gyro Development. Development of metal vapor lasers.
Structural Mechanics	A/C Stress Analysis, Finite Element Methods, Nastran/Stags, Dynamic, Aero-Thermo-Servo-Plastic Analysis, Viscoelasticity, Vibration, Impact and Shock wave analysis. Buckling, fatigue and fracture mechanics.
Plasma Physics	Nuclear Magnetic Resonance Gyro Development.

APPLICATION AREA	EXPERTISE
PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS	
Human Resources.	Application of human factors training research and techniques to improve personnel training, assessment of training effectiveness.
TRANSPORTATION	
Global Navigation Systems. . . .	Design and Development of all systems.

CONTACT: Mr. Jerome Bortman
Code 7004
Naval Air Development Center
Warminster, Pennsylvania 18974
Telephone: (215) 441-3100

NAVAL AIR ENGINEERING CENTER
Lakehurst, New Jersey 08733

APPLICATION AREA	EXPERTISE
COMPUTERS, CONTROL AND INFORMATION THEORY	
Computer Software	Computer programming, programming languages, compilers, etc.
Information Processing Standards	Standards that are developed to provide for the economic and effective use of automatic data processing equipment and systems. These include standards for hardware, software, applications and data.
Information Theory	Theoretical studies relating to the measurement and transmission of information in a communication channel. Includes coding theory, information capacity, detection of signals in noise, etc.
Pattern Recognition	Includes feature extraction, image enhancement, image restoration, scene analysis and character recognition.
ENVIRONMENTAL POLLUTION AND CONTROL	
Air Pollution and Control	Air pollution from exhaust gases, odors, dust, etc.; control techniques and equipment; sampling and analytical techniques and equipment.
Noise Pollution and Control	Pollution in the environment by noise from any source including engine noise, machining noise, industrial noise, sonic boom.

APPLICATION AREA	EXPERTISE
Water Pollution and Control	Pollution by industrial wastes, analysis of pollutants, thermal pollution, oil pollution, control techniques and equipment.
MATERIALS SCIENCES	
Ablative Materials and Ablation	Heat resistant materials.
Adhesives and Sealants	Adhesives, glues, binders, etc. for all types of materials; sealants, seals and gaskets for all purposes.
Materials Degradation and Fouling	Aging, erosion, wear, weathering, deterioration, decay; biodeterioration, including fungus deterioration, etc.; corrosion and corrosion inhibition; rusting; embrittlement; tribology.
Composite Materials	Materials composed of two or more physically distinct constituents. Includes reinforced plastics, carbon or graphite composites, laminates, metal matrix composites, fiber wound composites, filled composites, particulate composites, etc.
Corrosion and Corrosion Inhibition	Corrosion of metals and corrosion inhibition; metal corrosion inhibitors; rusting.
Lubricants and Hydraulic Fluids	Chemical, mechanical and physical properties, performance and production of all types of oils, lubricants and hydraulic fluids; lubricant and hydraulic fluid additives. Includes solid lubricants, drilling fluids, greases, etc.

APPLICATION AREA	EXPERTISE
NONDESTRUCTIVE TESTING	
Ultrasonic Testing	Subsurface flaw detection, thickness measurement and the characterization of metallurgical or material properties of structures or materials by interrogation with energy in the form of sound waves.
Radiographic Testing	The use of radiant energy in the form of neutrons, X-rays or gamma rays for subsurface examination of opaque objects by producing graphical records or sensitized film.
Miscellaneous Testing.	Detection of surface or slightly subsurface flaws. Includes liquid penetrant, magnetic-particle, eddycurrent, etc.

CONTACT:
Mr. Michael Palamar
Code 9011
Naval Air Engineering Center
Lakehurst, New Jersey 08733
Telephone: (201) 323-2648
Autovon: 624-2648

NATIONAL AVIATION FACILITIES EXPERIMENTAL CENTER
Atlantic City, New Jersey 08405

APPLICATION AREA	EXPERTISE
ELECTRONICS AND AEROSPACE TECHNOLOGY	
Air Traffic Control	Terminal and enroute systems hardware components and equipment, software and software enhancements; data acquisition and display systems (radar and radar beaconry); collision avoidance systems; airborne and ground-based equipment; application of advanced technology.
Simulation and Analysis	Analytical models, real and fast time simulation of aviation concepts, procedures and equipment; operations research; human factors engineering; man-machine relationships; performance measuring.
Communications	Air-ground-air communications systems and equipment; spectrum management; interference identification and measurement; communications satellite system experimentation.
Guidance	TACAN, VOR/DME, LORAN, OMEGA, VLF and Area Navigation systems and equipment; VHF and Microwave Landing Systems (ILS-MLS) and equipment; performance monitoring.
Aircraft Safety	Crashworthiness; bomb security; flight and in-flight fire safety; postcrash fire safety; toxicity; aircraft and pilot performance; modified fuels and fuel systems; measurement of engine emissions.

APPLICATION AREA	EXPERTISE
Airport Safety	Airport lighting and visual guidance systems and equipment; airport weather observation and measurement; runway surfaces; wind shear; wake turbulence. CONTACT: James Woodall, Technical Advisor, ANA-1A FAA/NAFEC Atlantic City, New Jersey 08405 Telephone: (609) 641-8200, ext 3670 FTS 8 346-3670 Autovon: 234-3670

217

NAVAL BIOSCIENCES LABORATORY
Naval Supply Center
Oakland, California 94625

APPLICATION AREA	EXPERTISE
BUILDING INDUSTRY TECHNOLOGY	
Architectural Design and Environmental Engineering Bioengineering	Design and operation of enclosures, rooms, etc., for protection of workers in biological laboratories. Cost-effectiveness studies on air filtration requirements. Design of temperature controls.
CHEMISTRY	
Analytical Chemistry	Scanning electron microscope, NMR spectroscopy, gas chromatography, atomic absorption analysis, standard analytical chemistry methods.
ENVIRONMENTAL POLLUTION AND CONTROL	
Air Pollution and Control	Tracer techniques and determination of air mass movement. Aerosol generation research, sampling capabilities.
Water Pollution and Control	Rapid fingerprinting techniques for identification of sources of petroleum spills in marine environment.
Pesticides Pollution and Control	Basic studies on inhalation toxicity of airborne pesticides as influenced by particle size and concentration.
Environmental Health and Safety	Basic studies on inhaled, particulate contaminates; oncogenic effects; studies on survival and infectivity of airborne microbes; aerosol hazards generated in biological laboratories, consultation available for assessment of biological (and limited chemical) hazards associated with a laboratory operation.

APPLICATION AREA	EXPERTISE
MEDICINE AND BIOLOGY	
Biochemistry	Biological systems chemistry, assay and analysis.
Immunology	Experimental vaccines in animal hosts, routine and "state-of-the-art" ultrasensitive detection of antiviral, antibacterial and antifungal antibodies, development of fungal, bacterial and viral antigens and the mechanisms of immunologic defense in experimental hosts.
Microbiology	Study of airborne infections, microbial control of materials fouling the environment, ultrasensitive detection of bacterial, fungal and viral agents and routine clinical microbiology.
Pharmacology and Pharmacological Chemistry	Sensitive models for evaluation of antifungal drugs in experimentally-produced deep fungal disease are being used. Basic, biochemical and clinical pharmacology services are available.
Publich Health and Industrial Medicine	The laboratory is a division of the School of Public Health, University of California, Berkeley.
Toxicology	Study of inhaled pesticides in animal systems. The division of Marine Science has expertise in carrying out environmental toxicology research, including standard EPA bioassays, experiments on invertebrate uptake of Naval munitions wastes, interference in plankton growth of such wastes, and mutagenic properties using bacterial mugagenesis.

APPLICATION AREA	EXPERTISE
Veterinary Medicine.	This medical service has a research support function to ensure continuing research animal colony accreditation by the American Association for Accreditation of Laboratory Animal Care and a research commitment to investigate the naturally occurring diseases of marine mammals, especially those transmissible to man.
OCEAN TECHNOLOGY	
Biological Oceanography.	Expertise in coastal marine biology and related chemistry, with particular regard to occurrence, fate, and effects of oil and grease pollutants, particularly those of petroleum origin. Field sampling, pollutant monitoring and laboratory simulations of field conditions (microcosms), effects of dredging on inshore ecosystems, coral reef biology, and environmental analytic organic chemistry.
PROBLEM-SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS	
Environment.	Rapid fingerprinting techniques for identification of sources of petroleum spills in the marine environment. Biodegradation studies are being undertaken on a variety of compounds of industrial and military interest; included are mutagenic potential assessments.

CONTACT:
LT William M. Coleman III
Naval Biosciences Laboratory
Naval Supply Center
Oakland, California 95624
Telephone: (415) 832-6343
Autovon: 836-6343

NORTH CENTRAL FOREST EXPERIMENT STATION

Forest Service, USDA
St. Paul, Minnesota

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Research Program Administration and Technology Transfer	Technology transfer.
NATURAL RESOURCES AND EARTH SCIENCES	
Forestry	Information on all aspects of forestry.

CONTACT:
Planning and Application AD
North Central Forest Experiment Station
U.S. Forest Service
Folwell Avenue
St. Paul, MN 55108
Telephone: (612) 784-0251

NCSL
(Southeast Region)

NAVAL COASTAL SYSTEMS LABORATORY
Panama City, Florida 32401

ADMINISTRATION

APPLICATION AREA	EXPERTISE
Management Information Systems	Local planning and tracking.
Research Program Administration and Technology Transfer	Resource data base development.

BIOMEDICAL TECHNOLOGY AND HUMAN FACTORS ENGINEERING

APPLICATION AREA	EXPERTISE
Biomedical Instrumentation and Bioengineering	Diver monitoring.
Life Support Systems	Underwater breathing, diver heating.

DETECTION AND COUNTERMEASURES

APPLICATION AREA	EXPERTISE
Acoustic Detection	Hi-definition saver; mine hunting; underwater small detection.
Electromagnetic & Acoustic Countermeasures	Mine countermeasures; acoustic and torpedo countermeasures.
Magnetic Detection	Cryogenic magnetometers; magnetic signal processing.
Personnel Detection	Underwater swimmer detections.
Seismic Detection	Hostile weapon location.

ELECTROTECHNOLOGY

APPLICATION AREA	EXPERTISE
Electromechanical Devices	Underwater transducer; controlled acoustic noisemakers.

ENVIRONMENTAL POLLUTION AND CONTROL

APPLICATION AREA	EXPERTISE
Solid Wastes Pollution and Control	Ultrasonic sterilization.

APPLICATION AREA	EXPERTISE
Water Pollution and Control	Ship waste water control.
MATHEMATICAL SCIENCES	
Operations Research	Navy missions and systems remine, acoustic, torpedo countermeasures, diving, special and amphibious warfare.
MEDICINE AND BIOLOGY	
Physiology	Diver physiology.
NAVIGATION, GUIDANCE, AND CONTROL	
Navigation Systems	Small area navigation.
TRANSPORTATION	
Marine & Waterway Transportation	Swimmer delivery vehicles; advanced craft T&E.

CONTACT:
John Vickers
Naval Coastal Systems Laboratory
Panama City, Florida 32401
Telephone: (904) 234-4420
Autovon: 436-4420

NORTHEASTERN FOREST EXPERIMENT STATION
Forest Service, USDA
Broomal, Pennsylvania

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Research Program Administration and Technology Transfer	Technology transfer.
NATURAL RESOURCES AND EARTH SCIENCES	
Forestry	Information on all aspects of forestry.

CONTACT:
Albert Foulger
Planning and Application AD
Northeastern Experiment Station
U.S. Forest Service
6816 Market Street
Upper Darby, Pennsylvania 19082
Telephone: (215)-1614

NAVAL HEALTH RESEARCH CENTER
San Diego, California 92152

APPLICATION AREA	EXPERTISE
BEHAVIOR AND SOCIETY	
Job Training and Career Development	Use of actuarial methods for determination of the effectiveness of decision process
MEDICINE AND BIOLOGY	
Biochemistry	Studies of serum uric acid, serum cholesterol levels and brain waves as determinators for psychological and physiological stress.
Psychophysiology	Sleep and sleep deprivation effects on the brain and on performance; effects of noise on performance; peak performance as a function of time of day.
Psychiatry	Causes of psychiatric illenss; how to evaluate the extent of the illness and how to estimate the chances for recovery.
Stress Physiology	The effects of life changes on health and adjustment.

CONTACT:
Dr. Milton Richlin
Naval Health Research Center
Code 8090
San Diego, CA 92152
Telephone: (714) 225-7393

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
Cincinnati, Ohio 45226

APPLICATION AREA	EXPERTISE
BEHAVIOR AND SOCIETY	
Social Concerns	Conducts research on occupational stress and on the behavioral aspects of occupational safety and health.
CHEMISTRY	
Analytical Chemistry	Develops analytical methods for chemical agents found in occupational exposures.
HEALTH PLANNING	
Environmental and Occupational Factors	Recognition, evaluation, and control of occupational safety and health hazards; development of criteria for workplace safety and health standards; operates a Clearinghouse for Occupational Safety and Health Info.; annually publishes a Registry of Toxic Effects of Chemical Substances.
INDUSTRIAL AND MECHANICAL ENGINEERING	
Industrial Safety Engineering	Conducts safety research; develops control measures and devices for application to industrial and other work sites; certifies respiratory protection equipment, detector tubes, coal mine dust personal sampler units, and sound level meters.
General	Conducts research on industrial process modifications and design; modification, and maintenance of industrial equipment; develops control technology for health and safety hazards in industrial and other work-places.

APPLICATION AREA	EXPERTISE
MEDICINE AND BIOLOGY	
General.	Conducts occupational safety and health research including toxicology; occupational carcinogens; epidemiology of occupational diseases, respiratory diseases, ergonomics, stress physiology, and behavioral factors; develops recommended programs for delivery of occupational safety and health services.
	CONTACT: Mr. Al F. Schaplowsky National Institute for Occupational Safety and Health Robert A. Taft Laboratories 4676 Columbia Parkway Cincinnati, OH 45226 Telephone: (513) 864-8302 FTS: 684-8302

U.S. NAVAL OCEANOGRAPHIC OFFICE
Bay St. Louis, MS 39522

APPLICATION AREA EXPERTISE

OCEAN TECHNOLOGY AND ENGINEERING

Marine Geophysics and Geology. . . . .

Oceanographic Vessels, Instruments and Platforms. . . . .

Hydrography. . . . .

CONTACT: Mr. Clayton D. Griffith
Code 3030
U.S. Naval Oceanographic Office
NSTL Station
Bay St. Louis, MS 39522
Telephone: (601) 688-4368
Autovon: 485-4368

NAVAL OCEAN SYSTEMS CENTER
San Diego, California 92152

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Management Information Systems	Planning, programming and budgeting.
Research Program Administration	Research management development planning and forecasting, identification of R&D needs and technical problem areas.
AGRICULTURE AND FOOD	
Animal Husbandry and Veterinary Medicine	Marine mammal biology, care, feeding, management, testing, training, pathology.
Fisheries and Aquaculture	Marine farming, cultivation of natural produce of ocean environment, marine mammal-fish interrelationships. Growing seaweed for commercial harvest as a potential fuel.
BIOMEDICAL TECHNOLOGY AND HUMAN FACTORS	
Biomedical Instrumentation and Bioengineering	Associated with marine mammals. Controls for wheelchairs, nonevasive blood pressure monitoring, complete stretchers, bed scales.
Human Factors	Ship design criteria for human performance, communication system layouts, effects of noise on performance and behavior, underwater systems for divers.
Life Support Systems	Diver protection, decompression, safe assent.
Bionics and Artificial Intelligence	Marine animals.

APPLICATION AREA	EXPERTISE
CHEMISTRY	
Analytical Chemistry	Techniques and instrumentation for separation and analysis of trace elements, individual compounds or specific groups of compounds both organic and inorganic.
Polymer Chemistry	Additives to reduce hydrodynamic drag forces, fluid flow friction and dispersion in fluid jet streams.
Photo and Radiation Chemistry	Radioactive elements and their reactions.
COMMUNICATION	
Communication and Information Theory	Theoretical studies relating to the measurement and transmission of information in a communication channel.
Radio and Television Equipment	General extensive experience in design of radio equipment.
Common Carrier and Satellite	General extensive experience in satellite communication.
COMPUTERS, CONTROL AND INFORMATION THEORY	
Computer Software	Large computer sciences department including systems architecture, applications software and ADP.
Computer Hardware	Design and development of special purpose computers, hybrid computers, computer accessories.
Control Systems and Control Theory	Theoretical studies of open- and closed-loop control systems, automatic control systems and principles including adaptive, continuous digital, distributed parameter, linear, multivariable, nonlinear, predictive, etc.

APPLICATION AREA	EXPERTISE
Information Theory	Theoretical studies relating to the measurement and transmission of information in a communication channel. Includes coding theory, information capacity, detection of signals in noise, etc.
Pattern Recognition	Includes features extraction, image enhancement, image restoration, and character recognition.

DETECTION AND COUNTERMEASURES

APPLICATION AREA	EXPERTISE
Acoustic Detection	Detection by means of sound waves, including ultrasonic and infrasonic radiation.
Optical Detection	Low light level TVs FLIRs, IR seekers.
Electromagnetic and Acoustic Countermeasures	Interception, jamming, anti-jamming, and deception of acoustic signals.
Nuclear Explosion Detection	Detection of nuclear explosions by measurement of nuclear radiation levels.
Personnel Detection	Detection of personnel by monitoring acoustic or seismic anti-intrusion devices. Doppler radar for personnel, vehicle and boot detection.

ELECTROTECHNOLOGY

APPLICATION AREA	EXPERTISE
Circuits	Circuit theory, network analysis, filters, amplifiers, oscillators, logic circuits, printed circuits, electronic modules, commutators, power supply circuits, phase locked systems, etc.
Electromechanical Devices	Electromechanical actuators for underwater use with motors, relays, switches, connectors, cables, etc.

APPLICATION AREA	EXPERTISE
Power and Signal Transmission Devices	Electric wires and cables, and fiber optics for signal and data transmission, electronic filters, etc.
Semiconductor Devices	Transistors, solid state devices, integrated circuits, etc.
General	Extensive expertise in all ranges and areas of electrotechnology including antenna design, electro-optics, radio-wave propagation and nuclear effects on communication equipment.
ENERGY	
Reserves-sources	Marine related sources. Conversion of marine biomass, thermosyphon, waves, etc.
Fuel Conversion Processes	Conversion of seaweed, temperature-differences, and wave motion.
Heating and Cooling	Solar heating of buildings, swimming pools, water, etc.
Solar Energy	Solar heating of buildings, etc. (see above).
ENVIRONMENTAL POLLUTION	
Noise Pollution and Control	Sources of noise, effect of noise on humans, theory, measurements, and devices for noise control.
Water Pollution and Control	Control of shipboard created pollution sources. Pollution from municipal and industrial waste, radioactive materials, biological and ecological effects. Biological indicators of stress on marine animals caused by pollution. Detection of trace elements.
Radiation Pollution and Control	Pollution of environment by particles and electromagnetic radiation from natural and manmade sources. Sampling and analytical techniques.

APPLICATION AREA	EXPERTISE
GOVERNMENT INVENTIONS FOR LICENSING	
Biology and Medicine	Numerous biomedical instrumentation available for licensing.
Electrotechnology	Fiber optics connectors, ship collision avoidance calculator, noise figure indicator are samples of many items available.
INDUSTRIAL AND MECHANICAL ENGINEERING	
Hydraulic and Pneumatic Equipment	Actuators for underwater applications.
Non-destructive Testing	Ultrasonic, radiographic, hydrostatic, etc.
LIBRARY AND INFORMATION SCIENCES	
Operations and Planning	Very large library available plus experience in all aspects of cataloging, filing, storage, etc.
Reference Materials	Library available to federal employees. Also provides some reference materials to public and private personnel.
MATERIALS SCIENCES	
Plastics	Acrylic domes and spheres for habitable underwater observation structures and vehicles.
MATHEMATICAL SCIENCES	
Algebra and Number Theory	Field, group and number theory multilinear algebra, theory of equations, vector spaces, etc.
Analysis (mathematics)	Calculus, calculus of variations, complex variables, differential equations, Fourier analysis, functional analysis, etc.

APPLICATION AREA	EXPERTISE
Geometry	Differential and Euclidean geometry, tensor analysis, topology, trigonometry.
Mathematical Logic	Foundations of mathematics, lattices, set theory, threshold logic.
Operations Research	Large operational research department involved in projects such as minimum manning requirements for future Navy ships. Game, cueing, and search theory; mathematical models, mathematical programming; network flows.
Statistical Analysis	Discrimate, factor, variance, and regression analysis. Nonparametric statistics, statistical decision theory, statistical distributions, statistical inference, statistical quality control, statistical tests.

MEDICINE AND BIOLOGY

APPLICATION AREA	EXPERTISE
Anatomy	Descriptive and comparative anatomy, dissection, neuroanatomy and morphology of marine animals.
Biochemistry	Studies of chemical processes in biological systems in marine organisms.
Ecology	Interrelationships of marine organisms and their environment, ecosystems and symbiosis in the marine environment.
Electrophysiology	Electric activity associated with living marine organisms and involved with life processes. Electrocardiography and encephalography. Neutral transmissions and responses of marine organisms to electrical stimulation.
Nutrition	Related to marine animals.
Zoology	Related to marine animals.

APPLICATION AREA	EXPERTISE
NAVIGATION, GUIDANCE AND CONTROL	
Control Devices and Equipment. .	Design, development and performance of underwater vehicles and weapons.
Guidance Systems	Underwater weapon preset, command, homing and terminal guidance systems.
Navigation and Guidance Systems Components	Acoustic underwater navigation systems for submersible vehicles and divers. Navigational sonars.
NUCLEAR SCIENCE AND TECHNOLOGY	
Nuclear Instrumentation.	Nuclear radiation detection and measurement devices and systems.
Radiation Shielding, Protection and Safety	Nuclear safety engineering procedures. Transport requirements for radioactive materials.
Radioactive Wastes and Radioactivity.	Handling, storage, and disposal of radioactive wastes.
OCEAN TECHNOLOGY AND ENGINEERING	
Marine Engineering	Design, construction and maintenance of marine equipment for underwater work, salvage, rescue, etc.
Dynamic Oceanography	Study of waves, currents, tides, and air-sea interactions.
Physical and Chemical Oceanography	Physical and chemical properties of sea water and the ocean bottom. Sea ice studies.
Biological Oceanography.	Plant and animal life as it relates to its marine environment. Biological fouling, fouling mechanisms, and organisms.

APPLICATION AREA	EXPERTISE
Marine Geophysics and Geology. .	Geophysical and geological studies and surveys of the marine environment.
Oceanographic Vessels, Instruments, and Platforms . .	Support vessels, stable platforms, instrumentation and equipment to collect and process oceanographic data. Manned and unmanned submersibles for exploration, search, rescue, location, escape and survey work underwater.
Underwater Construction and Habitats	Man in the sea environment. Techniques, equipment, systems for undersea activity. Underwater work vehicles.

ORDNANCE

Fire Control Systems	Fire control, computers and directors for the firing of underwater weapons.
Underwater Ordnance.	Torpedo - air, surface, and underwater launched.

PHYSICS

Acoustics.	Generation and transmission of sound through water. Includes ultra- and infra-sonics.
Fluid Mechanics.	Theoretical and experimental studies of the dynamics and statics of fluids and of relative motion between fluids and solid bodies. Hydrodynamic and boundary layer studies.
Optics and Lasers.	Ground-to-ground communications, air-to-sea communications, seawater penetration of lasers.
Solid State Physics.	Physical properties of solids, semi-conductors, etc. Acoustic receivers and transmitters.

APPLICATION AREA	EXPERTISE
Structural Mechanics	Dynamics and statics of solid bodies, hollow shells and spheres. Kinetics, kinematics, shock and vibration, stress analysis and hydrodynamics.

PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS

Energy	Energy from marine biomass. Solar energy.
Environment	Marine environment. Urban noise and industrial noise.
Police and Fire	Propagation studies for fire department communications, speech scramblers, electronic devices for surveillance.

TRANSPORTATION

Global Navigation Systems	Developer of Omega worldwide navigation system.

URBAN AND REGIONAL TECHNOLOGY AND DEVELOPMENT

Environmental Management and Planning	Marine pollution and urban noise abatement and control.

CONTACT: Mr. Donald H. Courter
Naval Ocean Systems Center
San Diego, California 92152
Telephone: (714) 225-7455
Autovon: 933-7455
Alternate: Mr. Gerald E. Miller
Office of S&T
240 Cottage Street, SE
Salem, Oregon 97310
Telephone: (503) 378-4201/5460

NPRDC
(Far West Region)

NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER
San Diego, California 92152

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Management Information	Computer-based management information system.
Management Practice	Coordination of research and development efforts. Measurement of job performance.
Personnel Management, Labor Relations and Manpower Studies	Techniques for forecasting and costing of labor supply.
Research Program Administration and Technology Transfer	Coordination of research and development efforts. R&D applications program, Technology Transfer program.
BEHAVIOR AND SOCIETY	
Job Training and Career Development	Techniques and aids for enhancing performance. Development of training technology. Test and application of training systems. Research on acquisition of basic skills, and on information and decision processing. Selection using aptitude and vocational interest tests. Prediction of attrition.
Psychology	Attitude and motivation research. Applied psychobiology. Cross-cultural research.
Social Concerns	Research on social issues, including race relations, women in non-traditional careers, drugs, and alcoholism.

APPLICATION AREA	EXPERTISE
BIOMEDICAL TECHNOLOGY AND HUMAN FACTORS ENGINEERING	
Human Factors Engineering. . . .	Human factors evaluations of new and more automated systems.
COMPUTERS, CONTROL AND INFORMATION THEORY	
Computer Software.	Design and development of computer programs for data processing and statistical analysis.
HEALTH PLANNING	
Environmental and Occupational Factors.	Effects of shipboard environmental factors on job performance.
LIBRARY AND INFORMATION THEORY	
General.	Collection of books and journals in the social sciences. Lockheed Dialog system abstract search facilities.
MATHEMATICAL SCIENCES	
Operations Research.	Analysis of management systems.
Statistical Analysis	Discriminant, factor, variance, and regression analysis. Nonparametric statistics, statistical decision theory, distributions and inference.

CONTACT: Mr. Allan A. Sjoholm
Science Advisor
Navy Personnel Research and
Development Center
Code 201
San Diego, California 92152
Telephone: (714) 225-2712
Autovon: 933-2712
Alternate: Dr. Frank F. Sands
Code 201s
Telephone: (714) 255-7424
Autovon: 933-7424

U.S. ARMY NATICK RESEARCH AND DEVELOPMENT COMMAND
Natick, Massachusetts 01760

ADMINISTRATION

APPLICATION AREA	EXPERTISE
Management Information Systems	Computer based resource management system.

AERONAUTICS AND AERODYNAMICS

APPLICATION AREA	EXPERTISE
Parachutes	Systems and techniques for airdrop of personnel supplies and material from aircraft in flight.

AGRICULTURE AND FOOD

APPLICATION AREA	EXPERTISE
Food Technology	Food processing and preservation; food service equipment; food packaging; food science research and development.

CHEMISTRY

APPLICATION AREA	EXPERTISE
Analytical Chemistry	Mass spectrometers, gas/liquid chromatography, nuclear magnetic resonance spectroscopy, infrared/ultra violet/visible spectrophotometry, computer/analytical instruments interface.

ENVIRONMENTAL POLLUTION AND CONTROL

APPLICATION AREA	EXPERTISE
Solid Wastes Pollution and Control	Cellulose conversion process; solid waste management system; chemical/physical/biological treatment of solid wastes.
Water Pollution and Control	Anaerobic waste water treatment; design criteria for full-scale waste water treatment facility.

MATERIALS SCIENCES

APPLICATION AREA	EXPERTISE
Fibers and Textiles	Individual protection clothing,

APPLICATION AREA	EXPERTISE
Fibers and Textiles (Contd.) . .	personnel armor and personal life support equipment systems.
MATHEMATICAL SCIENCES	
Operations Research.	Application of scientific methods, construction models, conducts tests and surveys to determine effectiveness of current and potential operating systems.
MEDICINE AND BIOLOGY	
Microbiology	Detect incipient microbial spoilage, microorganisms and their toxins, control contamination by assuring good sanitation and preventing proliferation of microorganisms.
Nutrition.	Determine nutritional adequacy of foods and effects of storage, processing, new preservation techniques and new formulations.

CONTACT:
S. David Bailey
U.S. Army Natick Research and
Development Command
Natick, Massachusetts 01760
(617) 653-1000, Ext. 2577

NAVAL RESEARCH LABORATORY
Washington, D. C. 20375

APPLICATION AREA	EXPERTISE
CHEMISTRY	
Polymer Chemistry	Polymer characterization, combustion diagnostics atmosphere monitoring, mechanics and kinetics of chemical reactions. Basic and applied research in polymer synthesis and on structure properties. Areas: organic polymers, coatings, adhesives, composites, and polymer mechanics.
Analytical Chemistry	Advanced inorganic materials, Solid State Solution and Theoretical Chemistry, Electrochemical Devices and Electrode Structure.
Physical and Theoretical Chemistry	Colloid chemistry of oil and water wastes, surface phenomena of adhesion, lubrication, corrosion, catalysis, properties of molecules at interface, research in friction, wear and lubrication of sliding and rolling contacts; atmosphere control.
ENERGY	
Fuels	Fuels, including synthetic liquids, fire extinguishment, combustion and fire research, control of smoke and fire.
MATERIALS SCIENCES	
General	Microstructural characterization, weldability of advanced alloys, thermomechanical effects, Micromechanisms of crack growth, Naval fabrication and processing.

APPLICATION AREA	EXPERTISE
Ceramics, Refractories, and Glass	Processing and fabrication, microstructural development and characterization, strength and fracture behavior, plastic deformation; study and application, ceramics for electronic piezoelectric optical and other nonmechanical applications.
Non-Destructive Testing	Physical, mechanical and failure characterizations, fabrication and processing techniques, mechanical and failure analyses, high-temperature structural and ordnance applications.
General	Sub-critical crack growth and fracture, failure-safe design parameters, metallurgical optimization for high-strength metals, corrosion science related to advanced alloys, marine corrosion and cathodic protection. Elevated temperature behavior of materials, influence of environment on high temperature materials, basic mechanisms of radiation damage, criteria for improved structural design using high temperature materials. Reliability and life prediction techniques.

PHYSICS

APPLICATION AREA	EXPERTISE
Optics and Lasers	Electronic and magnetic properties, thermal and optical properties, laser materials interactions, optical radiation vulnerability, magnetostriction, advanced structural materials.
General	High-pressure effects, superconducting materials, superconducting electronics.
Structural Mechanics	Electronic properties on nonmetallic crystals and glasses, radiation induced defects, color centers, optical properties: fibers, windows, data processing materials.

APPLICATION AREA	EXPERTISE
General.	Resonance in magentic materials, spin-ordered magnetic phenomena, rare earth - transition metal magnetic materials, magnetic properties of amorphous materials. X-ray spectrochemical analysis, X-ray diffraction, band structure and superconductivity, plasma diagnostics. Phase transformations, crystalline defect states, microstructural effects in superconductors, elasticity, plasticity, mechanical phenomena. Radiation effects on infrared detectors, optical and electronic materials, and satellite components, solar cells, radiation belts, hardening satellite components against laser beams, radiation vulnerability, radiation curing of polymers, 2-MV-electron Van de Graaff, cobalt-60 source. Measurements on targets bombarded by MeV electron beams, deposition of energy by charged particles, high-intensity laser beam propagation, neutron transport, coherent bremstrahlungeam porpagation, neutron reactions in tissue resident elements. Materials analysis by means of charged particle beams, implantation of ions into solids energy charged particle beams, radiation effects caused by high energy charged particle beams, radiation damage in reactor materials, crystal studies by means of particle channeling techniques, ion-induced X-rays, modification of surface and subsurface properties by ion-implantation, 5 MV Van de Graaff. Preparation and development of magnetic dielectric, optic, and semiconductor materials, optical components and coatings, glass blowing, and microwave tube assembly. Surface and interface physics, cathode research and development, characterization of and growth of semiconductor, metal, and insulator films and surfaces, bonding and adhesion studies, thermionic energy

APPLICATION AREA	EXPERTISE
	conversion. Surface acoustic waves, microwave and millimeter wave integrated circuits, surface magnetostatic waves, microwave solid state sources, microwave ferrimagnetic components, millimeter wave device research.
Physics.	Ion implantation technology, high and low power devices for energy conversion, field effect transistor reliability and failure analysis, MIS failure physics; radiation vulnerability and hardening, high frequency microwave devices.
MEDICINE AND BIOLOGY	
Radiobiology	Radiations for biological and medical purposed, neutron beams for cancer therapy, radioisotope production, ion-induced X rays, 75 MeV cyclotron.
ELECTROTECHNOLOGY	
General.	Silicon device processing, microelectric fabrications, integrated circuit technology.
Semiconductor Devices.	Solid state theory, electrical and optical characterization of materials, impurity and defect studies, structural and electronic properties of amorphous semiconductors, optical magneto-optical studies of surface and interfaces.

CONTACT:
Mr. Emanuel Brancato
Naval Research Laboratory
Code 4104
Washington, D.C. 20375
Telephone: (202) [illegible]7-3046

DAVID W. TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER
Bethesda, Maryland 20084

APPLICATION AREA	EXPERTISE
AERONAUTICS AND AERODYNAMICS	
Aerodynamics	Aerodynamic development and support for following aircraft: Vertical/Short Takeoff and Landing; Circulation Control Rotor; X-Wing; remotely Piloted; and Wing in Ground Effect.
Test Facilities and Equipment	Subsonic and transonic wind tunnels and an anechoic flow facility.
BUILDING AND INDUSTRY TECHNOLOGY	
Structural Analysis	Computer and laboratory facilities for structural analysis of Naval ships.
Construction Materials, Components and Equipment	Materials development research includes new alloys, plastics, elastomers, composites and coating.
COMPUTERS, CONTROL AND INFORMATION THEORY	
Computer Software	Computer services and techniques for management problems, naval design and construction, and many areas of mathematical analysis.
DETECTION AND COUNTERMEASURES	
Acoustic Detection	Acoustic silencing of submarines and surface ships including reduction of sonar self-noise and target strength.
ENERGY	
Electrical Power Transmission	Engineering research to improve machinery and propulsion systems, and study of advanced electrical propulsion and power systems.

APPLICATION AREA	EXPERTISE
Fuels	Research in fuel development.
Engine Studies	Research to improve shipboard machinery and propulsion systems.
ENVIRONMENTAL POLLUTION AND CONTROL	
Noise Pollution and Control	Machinery Acoustic Analysis Test Center for noise reduction.
Solid Wastes Pollution and Control	Research concerning abatement of air and water pollution from Navy ships.
Water Pollution and Control	Research concerning abatement of water pollution from Navy ships.
INDUSTRIAL AND MECHANICAL ENGINEERING	
Non-destructive Testing	Non-destructive testing of fabricated structures.
MATERIAL SCIENCES	
Composite Materials	Materials development research including composites.
Iron and Iron Alloys	Materials development research including iron alloys.
Lubricants and Hydraulic Fluids	Materials development research including lubricants.
Materials Degradation and Fouling	Materials development research including fouling problems.
Nonferrous Metals and Alloys	Materials development research including nonferrous metals and alloys.

APPLICATION AREA	EXPERTISE
OCEAN TECHNOLOGY AND ENGINEERING	
Marine Engineering	Research and Development Center for Naval Vehicles utilizing towing basins, test tanks, variable pressure water tunnels, circulating water channel, and other unique facilities.
TRANSPORTATION	
Marine and Waterway Transportation	Current concepts under research and development include Hydrofoils, Surface Effect Ships, Air-cushion vehicles, Small Waterplane-Area-Twin-Hull Ships and conventional Naval vehicles.

CONTACT:
Basil V. Nakonechny
Code 1102.1
David W. Taylor Naval Ship R&D Center
Bethesda, Maryland 20084
Telephone: (202) 227-1681

NAVAL SURFACE WEAPONS CENTER
White Oak, Silver Spring, Maryland 20910

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Research Program Administration and Technology Transfer. . . .	Research management; development planning and forecasting; technology transfer program.
AERONAUTICS AND AERODYNAMICS	
Aerodynamics	Research and development in aerodynamics, hydrodynamics, and ballistics.
Parachutes and Decelerators. . .	Design, fabrication, and flight testing of deployable aerodynamic decelerators (such as parachutes, balloons, and decoys) for use in retardation, stabilization, flotation, and recovery of ordnance or in the acquisition of test data pertaining thereto.
Test Facilities and Equipment.	Facilities include a diverse complex of modern wind tunnels (to Mach 17), ballistics ranges, and hydroballistics tanks.
ATMOSPHERIC SCIENCES	
Physical Meteorology	Meteorological and propagation support for predicting and assessing electro-optical system performance.
BIOMEDICAL TECHNOLOGY AND HUMAN FACTORS ENGINEERING	
Prosthetics and Mechanical Organs	Fabrication of intermedullary rods and hip prothesis models for Army Medical R&D Command. These items entail the use of NITINOL, the "metal with a memory".
Life Support Systems	Development and testing of chemical and biological detection and protetion devices.

APPLICATION AREA	EXPERTISE
CHEMISTRY	
Analytical Chemistry	Ultra-microanalysis of explosives, thin layer chromatography of explosives; nuclear magnetic resonance spectroscopy; gas chromatography; high pressure liquid chromatography; mass spectroscopy. Sulphur chemistry of lithium/SO_2 batteries.
Industrial Chemistry and Chemical Process Engineering	Separators for secondary silver oxide/zinc batteries. Investigation of gas scrubbing systems. Atmospheric contaminant detection, control, and disposal.
Polymer Chemistry	High energy polymers (synthesis and characterization).
Basic and Synthetic Chemistry	Synthesis of high energy materials (nitro-compounds, fluoro-nitro compounds).
Photo and Radiation Chemistry	Photochemistry of aromatic nitro-compounds.
Physical and Theoretical Chemistry	Crystal and molecular structure. X-ray diffraction of aromatic and aliphatic nitro-compounds. Molten salt battery technology. High pressure reaction kinetics (spectroscopy). Pressure, volume, and temperature measurements of explosives. Explosive reactions between metals and/or reactive materials. Reaction kinetics, shock sensitivity, and thermal relaxation processes of explosives. Augmentation of explosive energy. High energy polymorphs. Physics and chemistry of propellants; transient burning rates, dynamics bulk modulus, and intrinsic instability of solid propellants, ignition phenomena of solid propellants. Evaluation of chemical warfare agents; detection techniques.

APPLICATION AREA	EXPERTISE
COMPUTERS, CONTROL AND INFORMATION THEORY	
Computer Hardware	Hardware adaptation for weapons test sets; application of microprocessors to weapons guidance systems; development of modular fire control minicomputers for fleet ballistic missiles and tactical weapons applications.
Computer Software	Software for sonar data reduction; for torpedo guidance; software adaptation for weapons test sets; software for trajectory simulation of missiles and torpedoes; programming for problems in hydrodynamics, aerodynamics, radar signatures, acoustic scattering, high energy lasers, and various other problems arising in the general mission function support of the Center; fire control software for fleet ballistic missiles; surface fire control software for tactical weapons; trajectory and model simulation in the hybrid computer facility (analog plus digital); geodesy and astronautics programming; software for intelligence analysis (Navy, Marine Corps); software for the AEGIS Combat System; computer graphics software for electronic circuits and mechanical design and for geoballistic and orbital problems.
Control Systems and Control Theory	Surface weapon system control and integration; max-min optimization theory.
Pattern Recognition and Image Processing	Electro-optical, electromagnetic, and acoustical signal processing.
DIRECTION AND COUNTERMEASURES	
Acoustic Detection	Undersea acoustic surveillance; acoustic simulation; advanced submarine sonars; advanced passive sonobuoys; processing of acoustic data.

APPLICATION AREA	EXPERTISE
Infrared and Ultraviolet Detection	Narrow-band infrared detector development; multicolor crystalline and amorphous infrared detector development; atmospheric transmission; infrared signatures.
Magnetic Detection	Magnetic signature reduction. Magnetic sensor; magnetometer development; microsensor design and fabrication.
Seismic Detection	Seismic sensors.
Optical Detection	Search sets, laser radars.

ELECTROTECHNOLOGY

Antennas	Design of microstrip and other conformal antennas; castable antennas; short pulse antennas. Test and evaluation in anechoic chambers.
Circuits	Special packaging of microelectronic circuits. Advanced computer memory design. Computer aided design of microelectronic circuits.
Electromechanical Devices	Adaptive optics.
Optoelectronic Devices and Systems	Adaptive optics; search sets, laser radar, electro-optic (warhead) fuzes.
Power and Signal Transmission Devices	Pulse-power transmission.
Resistive, Capacitive and Inductive Components	Thick and thin film hybrid circuits; Cermet resistor fabrication. Photolithography and chemical processing of microelectronic circuitry; sputter processing.
Semiconductor Devices	Infrared detector development; radiation hardness testing; amorphous semiconductor photodetection; electronic noise studies.

APPLICATION AREA	EXPERTISE
ENERGY	
Energy Use, Supply, and Demand	Computer-based electrical energy management system.
Batteries and Components	R&D in electrochemical power sources.
ENVIRONMENTAL POLLUTION AND CONTROL	
Air Pollution and Control	Study of air pollution monitoring and control technology. Design and fabrication of a mobile wet scrubber facility and a mobile electrostatic precipitator facility to determine experimentally the effectiveness of each type of control on various sources of fine particulates.
Noise Pollution and Control	Noise abatement and control. Design concept for system to measure acoustic noise at remote locations.
Radiation Pollution and Control	Design and development of radiation instruments for health physics and development of personnel dosimeters.
INDUSTRIAL AND MECHANICAL ENGINEERING	
Quality Control and Reliability	Development and testing of product quality control and reliability procedures and standards.
Environmental Engineering	Measurement and simulation of all natural and induced environments.
Manufacturing Processes and Materials Handling	Development of prototype manufacturing procedures with associated product handling and packaging.
Nondestructive Testing	X-rays, ultrasonics, optical, etc.

MATERIALS SCIENCES

APPLICATION AREA	EXPERTISE
Ablative Materials and Ablation	Strategic systems materials technology (carbon-carbon composites, bulk graphite); rocket nozzle materials; reentry nosetips.
Ceramics, Refractories, and Glass	Reentry nosetips; electromagnetic sensor windows.
Composite Materials	Carbon-fiber and Kevlar-fiber reinforced plastics. Degradation studies: moisture, ultraviolet radiation, abrasion, rough handling. Failure mechanisms. Silicon carbide/aluminum alloy matrix modification. Mechanical properties evaluation. Process development. Joining development of metal matrix composites. Positron nondestructive testing. Composite armor design and evaluation.
Corrosion and Corrosion Inhibition	Corrosion resistance of composites; graphite/aluminum, silicon-carbide/aluminum aircraft alloys. Depleted uranium alloys; atmospheric corrosion; aqueous corrosion, stress corrosion cracking.
Elastomers	Shock and vibration attenuation in polyurethane foams. Hydrolytic stability. Fluid and solvent resistance. Anechoic coatings.
Fibers and Textiles	Kevlar-Mylar composites for aerostats. Abrasion resistance, rough handling, ultraviolet radiation degradation.

APPLICATION AREA	EXPERTISE
Iron and Iron Alloys	Analytical and experimental investigation of armor materials. Improved design and fabrication techniques for gun barrels to extend fatigue and wear life and reduce weight. Design, fabrication and evaluation of blast-fragmentation warheads. Magnetic measurements on HY 80, HY 100 Steels; effects of processing and material texture on magnetic properties. Controlled fragmentation techniques. Dynamic fracture studies. Design and evaluation of high strength steel and heavy metal alloy penetration. Ballistic evaluation of armor materials.
Lubricants and Hydraulic Fluids	Characterization of ignition/combustion properties of oils, lubricants and hydraulic fluids.
Materials Degradation and Fouling.	Moisture and ultraviolet degradation of Kevlar and carbon. Hydrolytic stability of polyurethane foams. Ultrasonic detection of defects.
Miscellaneous Materials.	Intermetallic reactions for underwater cutting; pyranol self-destruct devices. Soft magnetic amorphous materials; magnetic properties. Metallurgical and metallographic investigations.
Nonferrous Metals and Alloys . .	Lithium/boron alloys, lithium/boron/magnesium lightweight structural alloys (characterization). Nitinol applications. Technology for fabrication of lightweight battery electrodes (Ni-Cd batteries). Electrochemistry of lithium/boron alloy electrodes. Molten salt battery technology.
Plastics	Low loss millimeter wave properties of polymers and composites. Molding materials for encapsulating compounds. Zero shrinkage polymers (synthesis, spiro-ortho-esters). Relations of physical properties to molecular structure. Compressibility, acoustic properties, electrical resistance, impact resistance.

APPLICATION AREA	EXPERTISE
Refractory Metals and Alloys . .	Erosion resistant materials. Nose cones. Tantalum/carbon-loaded graphite materials.
MATHEMATICAL SCIENCES	
Analysis (Mathematics)	Fluid mechanics, structural mechanics, numerical analysis, aeroballistics, geoballistics.
Geometry	Projective geometry.
Mathematical Logic	Computer software design.
Operations Research.	Probability theory, game theory, optimization theory, utility theory.
Statistical Analysis	Baysian and non-Baysian statistics; design and analysis of experiments.
NATURAL RESOURCES AND EARTH SCIENCES	
Snow, Ice, and Permafrost. . . .	Acoustic phenomena in the arctic environment.
NAVIGATION, GUIDANCE, AND CONTROL	
Control Devices and Equipment. .	Aerodynamic and hydrodynamic control devices.
Guidance Systems	Surface-to-surface and surface-to-air guidance; underwater guidance.
Navigation and Guidance System Components.	E/O, RF, and IR detectors; active and semiactive guidance subsystems; satellite transmitters and receivers.
Navigation Systems	Data link design; orbital mechanics; satellite geodesy; satellite and ocean communication.
NUCLEAR SCIENCE AND TECHNOLOGY	
Isotopes	Nuclear chemistry facility for handling high and low activity levels of radionuclides (including plutonium and strontium 90 used in isotopic generators).

APPLICATION AREA	EXPERTISE
Nuclear Auxiliary Power Systems	Studies in the environmental interaction of SNAP devices.
Nuclear Explosions and Devices	Effects of underwater nuclear explosions. Effects of atmospheric explosions, including effects on electronics. Thermal radiation effects, shielding and radiation detection, and air blast. Design of nuclear weapons with low intrinsic (ambient) radiation.
Nuclear Instrumentation	Design and development of radiation instruments for health physics and development of personnel dosimeters.
Radiation Shielding, Protection, and Safety	Shielding of nuclear weapons aboard ship for personnel protection from neutrons and gamma rays.
Reactor Engineering and Power Plants	Measurement of radionuclides escaping from nuclear power plants and studies of entry into man's food chain. Consult on nuclear reactor safety problem (shock wave propagation, safety engineering, design review and analysis with respect to containment capability).
Reactor Physics	Neutron transport theory.
ORDNANCE	
Ammunition, Explosives and Pyrotechnics	R&D of gun ammunition (76 mm to 8-inch); R&D in explosives, fuzes and warheads for Naval weapons.
Armor	Ballistic evaluation of armor materials. Composite armor design and evaluation.
Bombs	Exterior ballistics of free-fall weapons; design and optimization of bomb fuzes.

APPLICATION AREA	EXPERTISE
Detonations, Explosion Effects, and Ballistics	Detonation theory; mathematical modeling of explosions and their effects; nuclear weapons effects; ballistics and hyperballistics (theory and test facilities).
Fire Control and Bombing Systems	Electro-optical, electromagnetic, and hydroacoustical fire control systems; OTH (Over-the-Horizon) tracking; fuzing explosives and explosive effects.
Guns	Engineering design and testing of guns, gun mounts, and ammunition.
Rockets	Surface-to-surface, surface-to-air, underkeel; propulsion technology; launchers and guidance.
Underwater Ordnance	Mines, torpedoes, sonars, swimmer devices, rockets, fire control.
General	Principal Navy R&D Center for Surface Warfare.

PHOTOGRAPHY AND RECORDING DEVICES

Holography	Holographic interferometry (system design and fabrication).
Photo-Electro-optical Engineering	Design of night vision cameras; IR covert operation cameras; polarization recorder for road surface texture measurement.
Photographic Techniques and Equipment	Technical photography; high-speed data acquisition; portable, shoulder-mounted, aerial drop photography.
General	Audiovisual production and projection techniques.

APPLICATION AREA	EXPERTISE
PHYSICS	
Acoustics.	Anechoic coatings (theoretical and experimental studies); scattering of sound by viscoelastic structures; modulus of elasticity; dispersion of sound; nonlinear acoustics.
Fluid Mechanics.	Boundary layer transition; turbulent boundary layers; vortex fields; compressibility of viscous fluids; projectile motion; water-entry problems.
Optics and Lasers.	Far infrared laser design; adaptive optics, laser radars.
Solid State Physics.	Electrooptical, magneto-optical, and transport properties of narrow bandgap semiconductors. High field transport phenomena and magneto-phonon resonance in III-V compounds. Magnetoelastic effects in rare earth/iron compounds. Domain wall dynamics in thin magnetic films. Radiation damage in semiconductors. Transport phenomena in rare earth doped IV-VI alloys.
Plasma Physics	Propagation of electron beams. Interaction of high intensity charged particle beams with matter. Plasmas produced by high intensity X-ray sources.
Radiofrequency Waves	Dielectric millimeter wave transmission lines. High power radiofrequency generators.
General Physics.	Properties of dielectrics. Magnetic properties of rare earth/iron compounds. Ion implantation depth profiles. Surface analysis (elemental composition of surfaces). Statistical physics. Electronic noise. Physics of high pressure. Non-equilibrium statistical mechanics. Equations of state at high pressure. Cohesive energy calculations. Statistical theory of liquids and solids. Fracture Mechanics.

APPLICATION AREA	EXPERTISE
PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS	
Police, Fire, and Emergency Services	Night vision device evaluation. Small, low-power, programmable electronic timer for covert switch actuation. Graphical slide rule to estimate downwind hazard from accidental chemical discharges.
Environment	Ordnance pollution abatement; methods to eliminate waste propellant, explosive, and pyrotechnic materials and to monitor these materials in the environment. Noise abatement and control. Design and fabrication of mobile wet scrubber and mobile electrostatic precipitator to measure effectiveness of each type on various sources of fine particulates.
TRANSPORTATION	
Transportation Safety	Developing system to reduce incidence of derailment (wheel-bearing temperature and vibration sensors with automatic air-brake actuator). Developed standards for packaging hazardous materials. Mobile unit for rapid measurement of highway surface texture.
URBAN AND REGIONAL TECHNOLOGY AND DEVELOPMENT	
Transportation and Traffic Planning	Self-powered vehicle detector for traffic counting and control.

CONTACT:
F. J. Gleason
Naval Surface Weapons Center
Code CL
White Oak, Silver Spring,
Maryland 20910
Telephone: (301) 394-1505
Autovon: 290-1505

NAVAL UNDERWATER SYSTEMS CENTER
New London, Connecticut 06320

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Inventory Control	Inventory control systems, minor property, instrumentation, plant account.
Management Practice	Procurement management systems, cost analysis, management analysis, effectiveness evaluation of laboratory performance.
Management Information	Zero base budgeting, equipment management.
Personnel Management, Labor Relations, and Manpower Studies	Personnel evaluation, resource and workload analysis, project management training source.
Research Program Adminstration and Technology Transfer	R&D planning and management, identification of technical problem areas and research needs, technology transfer program.
Computer Application	Data base systems for management, PERT.
AGRICULTURE AND FOOD	
Fisheries and Aquaculture	Instrumentation.
BEHAVIOR AND SOCIETY	
Psychology	Environmental reaction and personnel interactions, job satisfaction, human behavior, adjustment, attitudes, intelligence, judgment, leadership and motivation, personality studies.

APPLICATION AREA	EXPERTISE
BIOMEDICAL TECHNOLOGY AND HUMAN FACTORS ENGINEERING	
Biomedical Instrumentation and Bioengineering	Extensive sensors and signal processing displays and specialized instrumentation capabilities, ultrasonic theory and transducer design.
Human Factors Engineering	Display systems, format evaluation, capacity for studies and equipment review to meet human engineering standards.
COMMUNICATION	
Common Carrier and Satellite	Satellite systems used for communication navigation and data links for oceanographic programs.
Graphics	Extensive graphic display capability for use in data analysis as well as system configuration experiments.
Verbal	Extensive analysis capability with experience in speech scramblers.
Communication and Information Theory	Submarine radio and acoustic communication systems.
COMPUTERS, CONTROL AND INFORMATION THEORY	
Computer Hardware	Extensive use of all types of computers and computer systems for instrumentation as well as military systems.
Computer Software	Computer programming, programming languages, large-scale systems of computer applications.
DETECTION AND COUNTERMEASURES	
Acoustic Detection	Major portion of the Center's mission related to sonar system development and acoustic data collection.

APPLICATION AREA	EXPERTISE
Electromagnetic and Acoustic Countermeasures	Program work involved in both hull-mounted and deployable countermeasures.
Infrared and Ultraviolet Detection	Infrared surveys of ocean temperature and thermal plumbs in thermal gradients.
Optical Detection	Night vision devices for shipboard application and submarine periscope systems.
Radio Frequency Detection	ULF and VLF radio communication programs and related propagation studies.
ELECTROTECHNOLOGY	
Antennas	Specifications of antenna configurations for submarine communication and data buoys.
Circuits	Design and design review capability of analog and digital circuits.
Optoelectronic Devices and Systems	Underwater laser applications and submarine periscope studies.
ENERGY	
Engine Studies (Energy Related)	Small high performance combustible engine for torpedo applications and test and evaluation of high density fuels.
Batteries and Components	Battery development capability for high energy density storage systems for electrically propelled torpedos and other uses.
Solar Energy	Experience in solar systems design for domestic hot water, heating and cooling buildings, large scale photovoltaic systems and ocean engineering in support of thermal energy conversion projects.

APPLICATION AREA	EXPERTISE
Miscellaneous Energy Conservation and Storage	Photovoltaic applications, wind plant siting, hybrid systems, fuel cells and advanced heat pump designs, energy conversion systems.
Environmental Studies	Monitoring of river dredging, deep ocean surveys, studies related to coastal areas, and analysis capability including detection of heavy metals in salt water.
ENVIRONMENTAL POLLUTION AND CONTROL	
Noise Pollution and Control	Extensive capability in acoustic data collection and analysis.
Environmental Impact Statement	Experience in preparation of Environmental Impact Statements associated with dredging and monitoring dump sites for spoils.
GOVERNMENT INVENTIONS FOR LICENSING	
Mechanical Devices and Equipment	Techniques associated with design and evaluation of torpedos and handling systems; acoustic sensors and oceanographic data collection devices.
Chemistry	Battery techniques.
Instruments	An acoustic ships speed indicator is available for licensing.
Optics and Lasers	Helix Pitch Monitor is available for licensing.
INDUSTRIAL AND MECHANICAL ENGINEERING	
Environmental Engineering	Environmental testing.

APPLICATION AREA	EXPERTISE
Nondestructive Testing	Shock and vibration testing and simulated explosive shock.
LIBRARY AND INFORMATION SCIENCES	
Information Systems	Management information systems, computer library management system and data bank.
Reference Materials	Information storage and rapid retrieval systems; master control computer program, or line literature searching.
MATERIALS SCIENCES	
Ceramics Refractories and Glass	Extensive experience in use of piezoelectric ceramics for use in underwater hydrophones and transducers.
MATHEMATICAL SCIENCES	
Operations Research	Models, game theory, programming and flows.
General	Field and group theory, multilinear algebra, complex variables, Fourier analysis, functional analysis, Euclidean geometry, topology, set theory, statistical analysis.
NAVIGATION, GUIDANCE, AND CONTROL	
Control Devices and Equipment	Fire control systems.
Guidance Systems	Torpedo guidance systems.
Navigation Systems	Range facilities for underwater tracking of ships and weapons and accuracy measurements of navigational systems.
OCEAN TECHNOLOGY	
Marine Engineering	Underwater system design and deployment technology.

APPLICATION AREA	EXPERTISE
Dynamic Oceanography	Modeling of ocean parameters especially those which affect acoustic propagation.
Physical and Chemical Oceanography	Studies and support of acoustic modeling programs.
Biological Oceanography	Studies to determine impact of biological matter or acoustic propagation.
Oceanographic Vessels, Instruments and Platforms	Facilities in Newport, New London, Bermuda and Ft. Lauderdale.
ORDNANCE	
Underwater Ordnance	Development of torpedos with underwater demolition capability.
PHOTOGRAPHY AND RECORDING DEVICES	
Holography	Holographic evaluation of vibrating systems.
Photographic Techniques and Equipment	Extensive capability especially in underwater photography.
Recording Devices	Extensive capability in collection of both analog and digital data especially from acoustic sources,
PHYSICS	
Acoustic	Extensive capability in underwater acoustics; sonar systems, both active and passive with acoustic communication.
Fluid Mechanics	Research facilities for measuring flow noise induced by fluid flow.
Optic and Lasers	Optics laboratory for laser and electro-optic R&D as well as application of lasers to signal processing.

APPLICATION AREA	EXPERTISE
Structural Mechanics	Finite element analysis of complex structures.
Radio Frequency Waves	Propagation studies.

PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS

Education	Computerized vocational education model.
Energy	Solar energy, energy conservation.
Environment	Preservation of near shore environment, oil on water sensors.
Police, Fire and Emergency Services	Asset management system, records management system, fuel dispensing system, emergency communications, speech scramblers.
Transportation	Life cycle costing, self cancelling ticket, traffic management guide.
General	Full-Time Technology agent on IPA assignments to state and local government agencies.

CONTACT:
Dr. James Atkinson
Naval Underwater Systems Center
Code 0702, Bldg. 80T
New London, Connecticut 0620
Telephone: (203) 442-0771 ext. 2908

NIGHT VISION & ELECTRO-OPTICS LABORATORIES
Fort Belvoir, Virginia 22060

APPLICATION AREA	EXPERTISE
COMPUTERS, CONTROL AND INFORMATION THEORY	
Image Processing	Image enhancement techniques, target cueing, infrared target/background data base library.
DETECTION AND COUNTERMEASURES	
Infrared Detection	Ground devices for individual use or vehicle use; airborne systems for mapping or aviator maintenance.
Optical Detection	Searchlights visible use or as aid to night vision devices.
Personnel Detection	Detection of personnel by use of image intensifier or infrared devices.
ELECTROTECHNOLOGY	
Optoelectronic Devices	Visual, infrared.
Semiconductor Devices	Integrated circuits.
MATERIALS SCIENCES	
Ceramics, Refractories, and Glass	Fiber optics, micro channels, glass substrates.
Coatings, colorants and Finishes	Optical equipment.
PHOTOGRAPHY AND RECORDING DEVICES	
Photographic Techniques and Equipment	Capability to record target signatures/ radiometric data recording.
Recording Devices	Night vision field and laboratory devices for visual and infrared systems.

APPLICATION AREA	EXPERTISE
PHYSICS	
Optics and Lasers	Theory, Design of optical equipment, optical test equipment for visual through infrared spectrums.
Solid State Physics	Electro-optical materials (receivers/ detectors, emitters).
PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS	
Police, Fire and Emergency Services	Night vision devices.
Environment	Detection of pollution.
URBAN AND REGIONAL TECHNOLOGY DEVELOPMENT	
Fire Services, Law Enforcement and Criminal Justice	Night vision devices.
General	Any need or application to enhance the vision process thru electro-optics.

CONTACT:
Richard W. Fulton
USA Night Vision Laboratory
ATTENTION: AMSEL-NV-D
Fort Belvoir, Virginia 22060
Telephone: (703) 664-3923
Autovon: 354-3923

NAVAL WEAPONS CENTER
CHINA LAKE, CALIFORNIA 93555

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Computer Application	(PERT) planning/control, budget tracking/control; design/maintain/apply configuration and material support system (CADMSS).
Inventory Control	Establish/manage supply support in military standard areas; computer control of propellant inventory; major and minor plant equipment, plant account, explosives, material control.
Management Practice	Performance Evaluation; conduct data requirements review analysis for proposals; conduct change control systems aMilitary Standard Area) R&D management analysis, computer and mathematical analysis; cost analysis; evaluation of propellant laboratory pperformance.
Management Information	Bimonthly status/financial project reports; zero base budgeting, equipment management, budgeting, accounting, other techniques to direct plans and controls of propellant loading and mixing including evaluation of results.
Personnel Management, Labor Relations and Manpower Studies	Quarterly manpower projections; utilization and evaluation of personnel including cost analysis, manpower requirements; utilization and validation workload analysis; project management training sources.
Research Program Administration and Technology Transfer	Metallurgical research program administration; project engineering; program planning; R&D research management,

APPLICATION AREA	EXPERTISE
Research Program Administration and Technology Transfer (contd)	development, planning and forecasting; contract monitoring and management; identification of propellent, explosive, structural research needs and technical problem areas, technology transfer programs.
AERONAUTICS AND AERODYNAMICS	
Aeroballistics	Missile, airframe, control, propulsion analysis leading to system simulations; gun exterior ballistics -- test, computer simulations; analytical.
Aerodynamics	Missile, airframe, control, propulsion analysis leading to system simulations; preliminary design -- simulation wind tunnel experimentation; flight characteristics and problems of rocket motors, structural material analysis, aerodynamic stability; aerothermodynamics; load bearing materials for weapons application; aerodynamic configuration of weapon loads.
Aeronautics	Flight testing of rocket motors, dynamics, stability, control of propellant load, evaluation.
Aircraft	Aircraft wiring design; weapon system integration with aircraft systems; aerodynamics, stores separation, structural analysis; remotely piloted vehicles,
Parachutes and Decelerators	Parachute development design and test expertise; inlet/vehicle body interactions; drag stability; design, development and testing of vertical seeking escape seat.
Avionics	Radar warning receiver and weapon control avionics; weapon systems.
Test Facilities and Equipment	Evaluation capabilities for captive or free flight testing of airborne equipment; capabilities for testing

APPLICATION AREA	EXPERTISE
Test Facilities and Equipment (contd)	structural statics and dynamics; specialized test equipment and clean room for precision gyros, infrared detectors, coolers; special test equipment and stations for infrared missile guidance; optical test equipment and facilities; automatic (computer controlled) test equipment with design and programming options; projectile testing; high temperature air flow facility; altitude chamber; interior ballistics testing; light tunnel; chemistry labs; explosive and pyrotechnic testing; airbreathing engine and component testing facility to determine effects of spills of energetic liquid fuels, such as liquefied natural gas (LNG).
General	Prepare/review documentation in military standard areas.

AGRICULTURE AND FOOD

Agricultural Chemistry	Latex soil stabilization.
Agricultural Economics	Hydroculture in geothermal fluids.
General	Systems analysis.

ATMOSPHERIC SCIENCES

Meteorological Data Collection, Analysis and Weather Forecasting	Instrumenting and operating airborne systems for atmospheric data collection.
Monitoring	Atmospheric conditions and air quality; wind siting experimentation and analysis.
General	Atmospheric distribution of exhaust products from exhaust launches; effects of geothermal emissions on local weather.

APPLICATION AREA	EXPERTISE
BEHAVIOR AND SOCIETY	
Job Training and Career Development	On the job training, technician training, junior professional training and tours; job rotation and specialized short/long term complementary education; technical and managerial training.
BIOMEDICAL TECHNOLOGY AND HUMAN FACTORS ENGINEERING	
Biomedical Instrumentation and Bioengineering	Cell colony counting instrumentation.
Life Support Systems	Protection for aviators against terminal ejection hazards through improved ejection methods.
BUILDING INDUSTRY TECHNOLOGY	
Architectural Design and Environmental Engineering	Low energy structures program.
Structural Analyses	General capability; analysis and testing of ship compartments; structural reaction to fire and missile impact; design work for U. S. Coast Guard.
BUSINESS AND ECONOMICS	
General	Weapon system cost modeling; system analysis studies; energy economics - trade-offs, paybacks, etc.
CHEMISTRY	
Analytical Chemistry	Metals analysis and general materials analysis capability; gas chromatography; mass spectrometry; infrared spectroscopy; techniques and instrumentation for analysis of trace elements, individual compounds or specific groups of compounds; included are qualitative, volumetric, gravimetric, optical, methods; complete facilities for solid and liquid propellent analysis.

APPLICATION AREA	EXPERTISE
Basic and Synthetic Chemistry	Capabilities for synthesizing propellant and explosive formulations.
Industrial Chemistry and Chemical Process Engineering	Processing and handling of high sensitivity explosives; fuel-air explosive weapons manufacture; plants and process technology; cook-off and burn point testing and investigation.
Photo and Radiation Chemistry	Pyrotechnics; infrared decoy flares; analysis of laser reaction and degradation with propellant mixes.
Physical and Theoretical Chemistry	Kinetics; spectroscopy; photochemistry; rocket plume dynamics; study chemical reaction rates of propellants in natural atmosphere; molecular structure, chemical thermodynamics, theoretical molecular dynamics and molecular structure.
Polymer Chemistry	Polymer research and development capability; polymer characterization, combustion, monitoring, coatings, adhesives, composites and polymer mechanics.
General	Propellent engineering; organic chemistry.

CIVIL ENGINEERING

Construction Equipment, Materials and Supplies	Latex modified concrete.
Soil and Rock Mechanics	Soil stabilization.

COMMUNICATION

Communication and Information Theory	Coding, spread spectrum techniques; analysis, design and evaluation skills; command and control system programming and analysis; data busses; submarine radio and external communications systems.

APPLICATION AREA	EXPERTISE
Graphics	Computer interactive graphics system specification and operation; graphic display capability for use in data analysis as well as system configuration experiments.
Radio and Television Equipment	Development efforts to reduce video image smear of fast-moving objects; digitizing of the video frame for direct input to computers for assessment.
COMPUTERS, CONTROL AND INFORMATION THEORY	
Computer Hardware	Mini computer, including microprocessor applications, math modeling; programming, compilers, numerical analysis; data base systems; performance modeling and analysis; data management; management information.
Computer Software	Microprocessor system design; missle and avionics software; radar simulation; programming analog, digital and hybrid computers for analysis, modeling and complex simulation; laser eye safety analysis; software packages for special purpose and dedicated computers.
Control Systems and Control Theory	Applied to air-to-ground guided missiles; adaptive autopilots and control systems; computer control of guidance, radar, positioning; feed back and control systems for gyro and servo control pneumatic, electric and hydraulic servo flight control systems; determination of static and dynamic characteristics; control system design and development and testing; surface weapon propellant; system control integration.

APPLICATION AREA	EXPERTISE
Information Processing Standards.	Standards to provide for economic and effective use of automated data, processing equipment and systems, including hardware, software, applications and data.
Pattern Recognition and Image Processing	Electro-optic; infrared, radio frequency processing techniques; feature extraction and enhancement; character recognition.

DETECTION AND COUNTERMEASURES

Acoustic Detection	Sea mine sensors of all types; ultra-high frequency acoustic data transmission for fire and damage control aboard ships; noise monitoring; acoustic silencing of submarines.
Electromagnetic and Acoustic Countermeasures.	Anti-radiation missile countermeasures; simulation and test; electronic warfare and analysis test; mine countermeasures.
Infrared and Ultraviolet Detection.	Advanced IR detectors and detection techniques; IR countermeasures, IR signature measurements, modeling and analysis; IR detector material development and device fabrication; IR decoy flares and instrumentation; relation to propulsion sensitivity.
Magnetic Detection	Sea mine sensors; active and passive techniques for intrusion and metal detection applications.
Optical Detection.	Advanced electro-optic detection techniques including pyroelectric vidicons and charged-coupled device detectors.
Personnel Detection.	Personnel detection in foliage.

APPLICATION AREA	EXPERTISE
Radio Frequency Detection	Broadband direction finding systems; antennas, receivers, processors, millimeter wave radar; active and semi active RF seekers; facilities (instruments and anechoic chambers) exist for the design and test of low-power microwave systems and components.
ELECTROTECHNOLOGY	
Antennas	Broadband antennas and microwave arithmetic feed circuits; advanced missile, fire control and RF surveillance antenna systems; design and development using advanced technology.
Circuits	Digital/analog design, microwave (stripline/microstrip), electronic circuit design; advanced solid state circuitry; hybrid microelectronic devices, integrated circuits; related to missile propulsion.
Electromechanical Devices	Servo system design; advanced electromechanical control systems; design and evaluation of gyros, solenoids, high pressure valves, motors, pumps, servo valves, accelerometer, pressure transducers, gas generators; devices used in feasibility demonstrations of propulsion work; development, test, failure analysis.
Electron Tubes	Magnetrons and HV power supplies.
Optoelectronic Devices and Systems	Multilayer thin film optical filter synthesis, analysis and fabrication; optical and electro-optical system design.
Power and Signal Transmission Devices	Microwave power combiners and modulators; ignitor and impulse signals for propellant ignition.

APPLICATION AREA	EXPERTISE
Semiconductor Devices	High power solid-state microwave combiners; hybrid integrated circuits, fabrication and failure analysis; solar cell application.
General	Component reliability technology; quality assurance support.
ENERGY	
Batteries and Components	Power system analysis design and test evaluation; primary battery process technology; especially thermal battery silver zinc manufacturing technology.
Electric Power Production	Solar cell application studies and hardware; geothermal power production; solar electric generators.
Energy Use, Supply and Demand	Energy survey and monitoring of Navy bases; self-sufficiency analysis.
Environmental Studies	Geothermal related environmental studies; corrosion studies; studies to determine environmental and safety hazards of energetic liquid fuels such as liquified natural gas (LNG).
Fuel Conversion Process	Conversion of solid trash to polymer gasoline.
Fuels	Production, performance, storage, of all types of solid, liquid and gaseous fuels; alternate fuels development.
Geothermal Energy	Exploration techniques; utilization techniques.
Policies, Regulation and Studies	Geothermal legal institutional studies.
Solar Energy	Photovoltaic application studies and analysis.
General	General analysis studies.

APPLICATION AREA	EXPERTISE
ENVIRONMENTAL POLLUTION AND CONTROL	
Air Pollution and Control	Clean room, air cleanliness monitoring; experience in air quality monitoring.
Noise Pollution and Control	Experience in noise monitoring.
Solid Wastes Pollution and Control	Conversion of cellulose waste to polymer gasoline; experience in monitoring; control from propellant processing, mixing and extrusion.
Water Pollution and Control	Experience in monitoring and control.
Radiation Pollution and Control	Design and test capability for microwave (non-ionizing radiation); microwave safety committee member.
Environmental Health and Safety	General applications to health and safety standards.
Environmental Impact Statement	Experience in coordination with all agencies on environmental matters and experience in writing statements.
GOVERNMENT INVENTIONS FOR LICENSING	
General	Proximity and contact sensing safety-arming devices for warheads and rocket motors.
INDUSTRIAL AND MECHANICAL ENGINEERING	
Environmental Engineering	General environmental engineering and analysis; modification and maintenance of equipment and controls.

APPLICATION AREA	EXPERTISE
Hydraulic and Pneumatic Equipment.	Experience as related to weapon systems and test equipment; high pressure hydraulic component and system design, development and test; servo valve testing.
Industrial Safety Engineering.	Propellant.
Job Environment.	Developed working environment requirement (military standard).
Manufacturing Processes and Materials Handling	Materials processing technology; soldering technology and printed wiring processing; propellant storage and handling; chemical processing; fabrication techniques and thermionic and solid state device processing.
Nondestructive Testing	Missiles and avionics; nondestructive evaluation laboratory; X-ray scanning electron microscope; electrical, thermal cycling; propellants and propulsion structure; shock and vibration testing.
Production Planning and Process Controls	Development of hand soldering/machine soldering requirements and quality control methods; development of controls for checking solvent removal processes of ionic contaminants; sampling techniques, modeling techniques and program controls; operational controls.
Plant Design and Maintenance.	Feasibility studies, such as site selection, layout of utilities.
Quality Control and Reliability	Missiles and avionics; quality control testing; complete production, quality assurance, and reliability support capability.

APPLICATION AREA	EXPERTISE
Tooling, Machinery and Tools	Jigs, fixtures and die molds for producing special designed parts and assembling parts.
General	System safety support.

LIBRARY AND INFORMATION SCIENCE

Information Systems	Management information systems; data base management; current awareness of information retrieval.
Marketing and User Services	Marketing concepts, background planning, presentation and development.
Reference Materials	Technical library.

MATERIALS SCIENCES

Ablative Materials and Ablation	Solid ramjet fuels; high temperature insulation, low cost ablative materials, development and characterization.
Adhesives and Sealants	Plastics laboratory; development and characterization of structural adhesives and sealants.
Carbon and Graphite	Mechanical properties, metallurgical laboratory; fuel technology based on these materials.
Ceramics, Refractories and Glass	Cements, glasses, brick.
Coatings, Colorants and Finishes	Coatings and finishes specialists; experience with special coatings for filtering, corrosion resistance, wear resistance and reflective characteristics; conformal coating, solder mask, electro-plating.
Composite Materials	Mechanical properties, metallurgical laboratory; bonded propellants.

APPLICATION AREA	EXPERTISE
Corrosion and Corrosion Inhibition	Materials engineering; materials compatibility with liquid propellants and resistant to corrosion.
Elastomers	National parachute test range capabilities; mechanical and physical testing of sealants.
Fibers and Textiles	Reinforcing agents.
Iron and Iron Alloys	Materials engineering; special application for nonmagnetic, high pressure air systems; gun barrel analysis in conjunction with projectile rounds.
Lubricants and Hydraulic Fluids	Analytical chemistry; for special precision bearings (type of lubricants, application, amount of lubrication, etc.); chemical, mechanical and physical properties, fire resistance.
Materials Degradation and Fouling	Analytical chemistry; aging, erosion, wear, weathering, deterioration, decay; effects of radiation on materials, corrosion and inhibition; embrittlement.
Miscellaneous Materials	Materials engineering; polymer concrete.
Nondestructive Testing	Materials engineering; part screening and preconditioning technology.
Nonferrous Metals and Alloys	Materials Engineering; mechanical properties.
Plastics	Materials engineering; physical and mechanical properties performance and production, including stabilizers fillers and curing agents, casting; injection.

APPLICATION AREA	EXPERTISE
Refractory Metals and Alloys	Materials engineering.
Solvents, Cleaners and Abrasives	Application and method for use of cleaners, solvent for removal of polar-nonpolar contaminants and flux.
MATHEMATICAL SCIENCES	
Analysis (Mathematics)	Advanced mathematical analysis, modeling and computer simulation of complex systems; reliability prediction and methodology; analysis and simulations of physical and chemical processes; general.
Mathematical Logic	General.
Operations Research	Advanced war game techniques with computer simulation; formulation, injection and molding; analytical evaluations; computer simulations; general.
Statistical Analysis	Reliability assessments; (experimental and variances) concepts, data design criteria, predictions and analysis techniques; general use and expertise.
General	Systems analysis and simulation of electronic warfare and defense suppression system; electronic warfare operational analysis.
MEDICINE AND BIOLOGY	
Toxicology	Toxicity of propellants.
NATURAL RESOURCES AND EARTH SCIENCES	
Soil Sciences	Soil stabilization with latex emulsions.

APPLICATION AREA	EXPERTISE
NAVIGATION, GUIDANCE AND CONTROL	
Control Devices and Equipment	Automatic air vehicle control and recovery guidance; quality assurance systems safety and reliability development and production support capability.
Guidance Systems	Radio frequency direction finding; advanced control systems for missiles, drone aircraft, remote controlled vehicles, self-ejecting ejection seats and vertical launch systems; extensive experience and capability in automated and semiautomated guidance systems, control systems and devices, signal processing (detectors, gyros, optical gyroscopic telescopes, servo control systems, signal processing) design and test/evaluation capability for radar (microwave) systems and their subsystems.
Navigation and Guidance System Components	Microstrip, stripline, components and networks.
General	Advanced electro-optic, infrared and radio frequency tactical missile guidance and navigation systems, autopilots, general.
OCEAN TECHNOLOGY AND ENGINEERING	
Marine Geophysics and Geology	Extensive experience in design and fabrication of machinery and equipment for deep ocean environments; hydrazine gas generators.
Oceanographic Vessels, Instruments and Platforms	Experience in design and construction of deep ocean research submarines.

APPLICATION AREA	EXPERTISE
ORDNANCE	
Ammunition, Explosives and Pyrotechnics	Safety and arming of a wide variety of Naval ordnance; design, evaluation, documentation of sensitive explosive leads, detonators, and boosters; can prepare and handle, test, load and fire fleet issue guns, rockets and missiles from ground launchers; also these items plus bombs for air launchers; flares, gun propellants; fuel-air explosive fuels; perform research and development and test and evaluation on warheads, explosive systems and conventional weapon systems.
Bombs	Prepare bombs for air launch; fuel air explosive fuels; perform research, development, test and evaluation of warheads, explosive systems, and conventional weapon systems.
Combat Vehicles	General.
Detonations, Explosion Effects and Ballistics	Fuel air explosives; perform research, development, test, and evaluation of warheads, explosive systems, and conventional weapon systems.
Fire Control and Bombing Systems	Advanced shipboard missile and gun fire control systems.
Guns	Prepare, handle, test, load and fire fleet issue guns; liquid propellant guns; gun propellants; interior ballistics.
Rockets	Prepare, handle, test, load and fire fleet issue rockets; fuels; propellants.
Underwater Ordnance	General.

APPLICATION AREA	EXPERTISE
General	Development and production; reliability support; quality assurance system safety; missile propulsion (rockets, ramjets and turbojets).
PHOTOGRAPHY AND RECORDING DEVICES	
Holography	Holographic structural analysis.
PHYSICS	
Acoustics	Acoustical sensor applications.
Optics and Lasers	Waveguide laser technology and applications; range measuring devices; synthesis, analysis and fabrication of low loss multilayer thin film optical coatings.
Solid State Physics	Solid state circuitry and electromechanical components; piezoelectric materials growth.
Structural Mechanics	Missile structure design and analysis, aeromechanics and aerodynamics of missiles using LED and laser diodes.
Radio Frequency Waves	RF device technology development; sea surface RF scatter modeling.
General	Computations and analysis as applies to propulsion propellants and rocket motors.
PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS	
Energy	Studies in the areas of transportation of energetic liquid fuels.
Police, Fire and Emergency Service	Ranging communication systems.

APPLICATION AREA	EXPERTISE
General	Technology transfer; fire hazard and safety; life saving equipment for firefighters.
TRANSPORTATION	
Marine and Waterway Transportation	Studies in transportation of energetic liquid fuels.
Railroad Transportation	Transportation of energetic liquid fuels.
Road Transportation	Transportation of energetic liquid fuels.
General	Vehicles.

CONTACT: Mr. G. F. Linsteadt
Naval Weapons Center
China Lake, CA 93555
Telephone (714) 939-7325

317

NAVAL WEAPONS SUPPORT CENTER
CRANE, INDIANA 47522

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Management Practice	Cost effectiveness, management analysis.
Management Information Systems	Perform system analysis studies and develop automatic reporting systems to assist management in establishing and directing plans.
Personnel Management, Labor Relations, and Manpower Studies	Manpower allocation, utilization, validation and requirements; resources planning.
Research Program Administration and Technology Transfer	Identification and communication of research needs and technical problem areas.
AERONAUTICS AND AERODYNAMICS	
Parachutes and Decelerators	Drag parachutes, aerodynamic decelerators, design/development.
ATMOSPHERIC SCIENCES	
Weather Modification	Pyrotechnic devices for cloud seeding, weather modification, etc.
BEHAVIOR AND SOCIETY	
Organizational Psychology	Personnel interactions, behavior, adjustment, motivation, psychology, and psychometrics.
BUILDING TECHNOLOGY	Expertise relevant to all subcategories.

APPLICATION AREA	EXPERTISE
CHEMISTRY	
Analytical Chemistry	Complete analytical capabilities and associated instrumentation.
Industrial Chemistry and Chemical Process Engineering	Process/unit operations and equipment concerned with chemical processing and storage.
Basic and Synthetic Chemistry	Inorganic and organic reactions, molecular structure.
Photo and Radiation Chemistry	Particle radiation and chemical reactions, radio-chemistry.
Physical and Theoretical Chemistry	Reaction kinetics, chemical equilibria/thermodynamics, reaction mechanisms, etc.
CIVIL ENGINEERING	Capabilities in all subcategories.
COMMUNICATION	
Radio and Television Equipment	Design/maintenance of television and receiving equipment.
COMPUTERS, CONTROL AND INFORMATION THEORY	
Computer Hardware	Design, component selection, test and fabrication.
Computer Software	Programming in INCOBAL, FORTRAN, PL/I, BAL, EASYCODER, GPSS, etc.
Control Systems and Theory	Design, development, component selection, test and fabrication.
Information Processing Standards	Standards for hardware, software, applications and data.

APPLICATION AREA	EXPERTISE
Information Theory	Studies concerned with measurement/transmission of information in a communication channel.
DETECTION AND COUNTERMEASURES	
Electromagnetic and Acoustic Countermeasures	Development and test/evaluation.
Optical Detection	Detection by means of light including night vision devices.
Radiofrequency Detection	Detection/tracking using transmitted/reflected radio-frequency waves.
ELECTROTECHNOLOGY	
Antennas	Measurement, test/evaluation for parameters such as pattern, impedance, intensity principally for over-the-water capabilities.
Circuits	Circuit and module theory, design, development, fabrication, and test/evaluation.
Electromechanical Devices	Development, test, specifications, and failure analysis.
Electron Tubes	General capabilities.
Optoelectric Devices and Systems	Development, component application and test/failure analysis.
Power and Signal Transmission Devices	Specifications, test/evaluation.
Resistive, Capacitive, and Inductive Components	Development, specifications, test, application and failure analysis for basic components.

APPLICATION AREA	EXPERTISE
Semiconductor Devices.	Development, complete evaluation and product assurance capability, specifications, application, and failure analysis.
Electromagnetic Effects.	Test/evaluation, engineering analysis of equipment to determine emissions and effect of electromagnetic energy.
ENERGY	Capabilities in all general subcategory areas.
ENVIRONMENTAL POLLUTION AND CONTROL	
Air Pollution and Control.	Sampling and analytical techniques, general expertise in air pollution control.
Noise Pollution and Control.	Capabilities in all general areas.
Solid Wastes Pollution and Control.	Disposal of solid chemicals by composting and soil disposal; processing for separation and materials recovery; utilization; recycling; liquid disposal.
Water Pollution and Control.	Testing, photo degradation of waste chemical pollutants.
Environmental Health and Safety	Toxicology, industrial health.
HEALTH PLANNING	
Environmental and Occupational Factors.	Safety hazards related to pyrotechnics and high energy compounds, noise pollution, occupational and industrial hazards.

APPLICATION AREA	EXPERTISE
INDUSTRIAL AND MECHANICAL ENGINEERING	
Production and Process Controls	General capabilities in all planning and control areas.
Quality Control and Reliability	Total capability for electronic and ordnance devices/equipment.
Plant Design and Maintenance	Plant layout, utilities, tooling techniques.
Job Environment	Limited applied research capability related to job environment parameters.
Environmental Engineering	Design/maintenance of lighting and temperature controls, air conditioning, cooling systems, etc.
Tooling, Machinery, and Tools	Expertise in all general areas.
Manufacturing Processes	Capabilities in all related areas.
Non-Destructive Testing	Ultrasonic, radiographic, and hydrostatic test and evaluation facilities/capability.
MATERIALS SCIENCES	
Ceramics, Refractories, and Glass	General expertise.
Coatings, Colorants, and Finishes	Coatings and finishes.
Corrosion and Corrosion Inhibition	Complete facilities for research, development, and test/evaluation related to corrosion and prevention.
Elastomers	Complete evaluation and testing capability.

APPLICATION AREA	EXPERTISE
Iron and Iron Alloys	Complete lab capability for analysis, test and evaluation.
Lubricants and Hydraulic Fluids	Test and analysis capability.
Materials Degradation and Fouling	Complete evaluation and test facilities, particular expertise in material biodeterioration.
Nonferrous Metals and Alloys	Complete analysis, test and evaluation capability.

MATHEMATICAL SCIENCES

Algebra and Number Theory	Field, group, and number theory, theory of equations.
Analysis (Mathematical)	Calculus, calculus of variations, complex variables, differential equations, measure/integration and mathematical functions.
Operations Research	Complete operations research capability.
Statistical Analysis	Complete statistical analysis capability.

MEDICINE AND BIOLOGY

Microbiology	Microbial physiology, microbiology of materials.
Toxicology	As related to explosives and industrial chemistry only.

NATURAL RESOURCES

Natural Resource Management	Fish and wildlife management; conservation and management of land, water, forest.

APPLICATION AREA	EXPERTISE
Forestry	Protection and management, harvesting, logging.
NAVIGATION, GUIDANCE AND CONTROL	General capabilities for the four subcategory areas in design, development, test and evaluation of components, modules and equipment.
NUCLEAR SCIENCE AND EQUIPMENT	
Nuclear Explosions and Devices	Radiation testing, hardening, and effects.
ORDNANCE	
Ammunition, Explosives, and Pyrotechnics	Complete capability including design, development, failure/safety analysis, quality assurance, test/evaluation and production.
Bombs	Quality assurance for bomb type devices.
Combat Vehicles	Repair, overhaul.
Detonations, Explosive Effects and Ballistics	Study of motion, behavior, and aerodynamics of projectiles thrown or launched by ordnance projectors.
Fire Control and Bombing Systems	Design, development, test, and fabrication.
Guns	Overhaul, repair of guns, and related hardware/equipment, small arms design/development, test and evaluation.
Underwater Ordnance	Quality assurance; limited design/development capability.

APPLICATION AREA	EXPERTISE
PHOTOGRAPHY AND RECORDING DEVICES	
Photographic techniques and Equipment	Capabilities in essentially all areas.
Recording Devices	Capabilities in essentially all areas.
PHYSICS	
Acoustics	General capability.
Optics and Lasers	Design/development of optical equipment; electromagnetic waves.
Structural Mechanics	General capability.

CONTACT:
C. D. Robinson
Naval Weapons Support Center
Director, Applied Sciences
Department (Code 50)
Crane, Indiana 47522
Telephone: (812) 854-1282 or 1358
Autovon 482-1282

OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37830

APPLICATION AREA	EXPERTISE
BEHAVIOR AND SOCIETY	Regional Resource Analysis.
BIOMEDICAL TECHNOLOGY AND HUMAN FACTORS ENGINEERING	
Bioengineering	Biophysics and bioengineering.
Human Factors Engineering	Effects of energy technology.
ENERGY	
Miscellaneous Energy Conversion and Storage	Toroidal fusion reactor concepts; neutral beam injection; superconducting magnet development, tritium handling.
Energy Use, Supply and Demand	Improved materials and controls; appliance and insulation standards; energy use modeling.
Solar & Geothermal Energy	Low Temperature Heat Transfer; environmental assessments.
Fuel Conversion Processes	Coal conversion and combustion engineering; high efficiency thermal conversion; chemical and physical properties of coal.
General	Materials research; nuclear sciences; molecular science, heavy ion research.
Nuclear Energy Development	Fuel Cycle Research and Development Reactor Safety Research Breeder Reactor Development.
Fusion Energy Development	Toroidal Fusion Reactor Concepts Neutral Beam Injection Superconducting Magnet Development Tritium Handling.

APPLICATION AREA	EXPERTISE
Fossil Energy	Coal Conversion & Combustion Engineering High-Efficiency Thermal Conversion Chemical and Physical Properties of Coal.
Conservation	Improved Materials and Controls Appliance and Insulation Standards Energy Use Modeling.
ENVIRONMENTAL POLLUTION AND CONTROL	
Environmental Health and Safety	Environmental Effects of Energy Technology Toxicology, Carcinogenesis, Mutagenesis and Teratology. Biophysics and Bioengineering Environmental Policy Analysis.
MEDICINE AND BIOLOGY	
Toxicology	Toxicology, carcinogenesis, mutagenesis and teratology.
NUCLEAR SCIENCE AND TECHNOLOGY	
General	Fuel cycle research and development; reactor safety research; breeder reactor development.

CONTACT:
Mr. Donald Jared
TU/C
Oak Ridge National Laboratory
P.O. Box X
Oak Ridge, TN 37830
Telephone: (615) 483-8611, ext. 30121

PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
Forest Service, USDA
Portland, Oregon

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Research Program Administration and Technology Transfer	Technology transfer.
NATURAL RESOURCES AND EARTH SCIENCES	
Forestry	Information on all aspects of forestry.

CONTACT:
Eldon Estep
Planning and Application AD
Pacific Northwest Station
U.S. Forest Service
809 NE 6th Avenue
Box 3141
Portland, Oregon 97208
Telephone: (503) 234-3361

PACIFIC SOUTHWEST FOREST AND RANGE EXPERIMENT STATION
Forest Service, USDA
Berkeley, California

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Research Program Administration and Technology Transfer	Technology transfer.
NATURAL RESOURCES AND EARTH SCIENCES	
Forestry	Information on all aspects of forestry.

CONTACT:
Richard L. Hubbard
Planning and Application AD
Pacific Southwest Station
U.S. Forest Service
1960 Addison Street
Box 245
Berkeley, California 94701
Telephone: (415) 486-3286

U.S. AIR FORCE ROME AIR DEVELOPMENT CENTER
Griffiss Air Force Base, New York 13316

APPLICATION AREA	EXPERTISE
COMMUNICATION	
Communications ECCM	Digital tropo ECCM techniques; UHF adaptive antennas; multi-beam phased array; VLF broadband transmission; ECCM voice modem; LORAN C/D ECCM experiments.
All Weather Precision Targeting	Target detection location and strike.
Emitter Identification Location and Strike	Detection of Emitters.
Communications for Command and Control	Communications for command and control, UHF-VLF range.
Information Transmission	Intra- and inter-base communications.
Digital Communication Simulation and Experimentation	Simulate variety of transmission media to determine range fidelity and capacity.
DETECTION AND COUNTERMEASURES	
Surveillance ECCM	Development of signal processing and electronic devices as well as associated measurement and simulation techniques.
Active Target Identification and Location	Development of techniques for identification of aircraft and space objects; radar signature analysis; radar imaging for aircraft identification.

APPLICATION AREA	EXPERTISE
Strategic Target Surveillance	Radar Tracking; development and simulation of both tactical and general purpose Air Traffic Control facilities.
Tactical Ground Target Detection and Identification	Improved techniques and capabilities for detecting and identifying air and ground tactical targets.
Strategic Targeting	Photogrammetric imagery; digital imagery techniques.
Indications and Warning	Intelligence data integration and distributed intelligence networks; signal intelligence; technical intelligence.
Information Transmission	Development of solid state devices and thermionic tubes suitable for use in transmitters of aerospace data links.
Ground Sensors	Development of security alarm sensors for installations, aircraft, etc. to detect intruders.
ELECTROTECHNOLOGY	
Antennas	Studies of limited scan antennas resulting in an in-house development of multiple mode apertures for use with limited scan array.
Radio Frequency Components	Miniature RF and surface acoustic wave components for small lightweight radios.
Electromagnetic System Concepts	
Radar and RF Sensors	New airborne moving target indicator radar concepts and methods of detecting human intruders.

APPLICATION AREA	EXPERTISE
Radar Target Characteristics.	Techniques for the identification of military targets such as aircraft and ground vehicles, through radar signature analysis.
Radar Sensor Countermeasures.	Use of high energy laser beams for protection of aircraft against mismile attack.
Propagation	
Tropospheric	Investigations of feasibility of using millimeter wavelengths for ground-to-satellite and ground-to-aircraft wide band data links.
Ionospheric.	Establish operational limitations to Air Force communications, surveillance and navigation systems imposed by ionosphere.
Circuits	Large scale integrated circuit testing, reliability prediction for microwave transistors, microprocessor reliability. Reliability evaluation of complementary metal oxides technology in complex integrated circuits; large package hybrid microcircuit qualification tests. Standardization of printed circuit boards; maintainability design of digital systems/equipments; specifications, design guides and standards; printed circuit specifications and standards.
Electromagnetic Devices.	Develop analytical tools which will permit the designer to design electromagnetically compatible electronic systems.

APPLICATION AREA	EXPERTISE
Electromagnetic Devices (Contd.)	Techniques and devices for reducing; intermodulation products in collocated transmitters, output noise levels of broadband, solid state transmitters. Prepares for DoD all EMC standards.
Electronic Devices	Development of advanced solid state device processing technology and application of state-of-art technology to new device concepts.
Opto-Electronic Device Technology	Optical fiber communications.
LIBRARY AND INFORMATION SCIENCES	
Requirements Analysis	Develop standard tools and procedures for specifying requirements to allow verification and tracking for satisfying threat evaluation and functional system prototyping to analyze requirements and perform risk assessments and trade-off studies.
Disciplines Programming Environment	Test and evaluation of tools and procedures used in R&D and by software contractors; development of standards and requirements for support software; development of standards to improve consistency across the varying design, development, test and maintenance environments.
Quality Control	Gather reliable quantitative data on cost software developments including costs to design, produce, test and maintain, and reliability information.
System Architecture	Develop facilities, tools and procedures for emulating the full range of architectures for performing hardware/software/firmware total system design trade-offs.

APPLICATION AREA	EXPERTISE
NUCLEAR SCIENCE AND TECHNOLOGY	
Radiation Effects and Hardening	Hardening of components to withstand nuclear radiation.

CONTACT:
Fred N. DiMaggio, Chief, Technical Management Branch
Rome Air Development Center
Griffiss AFB NY 13441
Telephone: (315) 330-2973

ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES
Alexandria, Virginia 22333

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Personnel Management, Labor Relations and Manpower Studies	Selection, classification, and recruitment of Army personnel; occupational structure, duty modules, task analysis; training management technology.
Research Program Administration and Technology Transfer	Development, review, and conduct of research program, including both in-house and contract effort; administration of grants in behavioral and social sciences; Technical Cooperation Program (international); technical advisory service (within DOD).
BEHAVIOR AND SOCIETY	
Job Training and Career Opportunities	Training automation and simulation; group skill development; on-the-job training; career progression systems; tracking of training technology transfer; policies and processes affecting career commitment.
Organizational Psychology	Organizational effectiveness technology; OE program evaluation; team building; communication; leader training and evaluation.
Social Concerns	Human relations training development and validation; race relations/equal opportunity program management; human resource utilization; role of women in the Army; impact of family variables on soldier productivity.

APPLICATION AREA	EXPERTISE
Education, Law, and Humanities	Performance-based training and testing; self-instructional techniques and extension training; unit skill development and evaluation.
COMMUNICATION	
Communication and Information Theory	Battlefield information systems; man-machine interface; team operations with computerized command and control systems.
COMPUTER, CONTROL AND INFORMATION THEORY	
Information Processing Standards	Development of computerized information systems for research and procedures for data analysis.

CONTACT:
Dr. R. M. Sasmor
U.S. Army Research Institute
5001 Eisenhower Avenue
Alexandria, Virginia 22333
Telephone: (202) 274-8636

ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION
Forest Service, USDA
Fort Collins, Colorado

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Research Program Administration and Technology Transfer	Technology transfer.
NATURAL RESOURCES AND EARTH SCIENCES	
Forestry	Information on all aspects of forestry.

CONTACT:
Jay S. Krammes
Research and Application AD
Rocky Mountain Station
U.S. Forest Service
240 W. Prospect Street
Fort Collins, Colorado
Telephone: (303) 482-7332

SOUTHEASTERN FOREST EXPERIMENT STATION
Forest Service, USDA
Asheville, North Carolina

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Research Program Administration and Technology Transfer	Technology transfer.
NATURAL RESOURCES AND EARTH SCIENCES	
Forestry	Information on all aspects of forestry.

CONTACT:
David F. Olson, Jr.
Planning and Application AD
Southeastern Experiment Station
U.S. Forest Service
Post Office Building
Box 2570
Asheville, N. C. 28802
Telephone: (704) 672-0637

SANDIA LABORATORIES
Albuquerque, New Mexico 87115

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Engineering Systems Management	Technical management. Fiscal controls. Program direction. Component development. Quality assurance.
AERONAUTICS AND AERODYNAMICS	
Aeroballistics	Simulation, design and testing of individual and combinations of weapons and carriers.
Aerodynamics	Stability analysis, guidance and control, separation dynamics, flight simulation.
Parachutes and Decelerators	Chute design and development, fabric development, flotation and recovery devices.
Test Facilities and Equipment	Wind tunnels, flow-field studies, atomic fluid physics, and aerophysics.
General	Transport phenomena, heat shield, terradynamics.
ATMOSPHERIC SCIENCES	
Dynamic Meteorology	As affected by short term, rapid changes of state.
Physical Meteorology	Modeling and testing properties of atmosphere.
BIOMEDICAL TECHNOLOGY AND HUMAN FACTORS ENGINEERING	
Biosciences	Reactor siting, nuclear risk assessment, sterilization of space probes, sewage sludge treatment.

APPLICATION AREA	EXPERTISE
COMPUTERS, CONTROL AND INFORMATION THEORY	
Computer Software	Wide use of computers as tools.
Interactive Graphics	Product definition augmentation. CAD/CAMS.
Pattern Recognition and Image Processing	Use for scientific analysis and as general tool electro-optic materials development.
DETECTION AND COUNTERMEASURES	
Infrared and Ultraviolet Detection	Full spectrum of tools and personnel.
Nuclear Explosion Detection	Complete capability in all environments.
Personnel Detection	Safeguard control.
Seismic Detection	Wide range of capabilities and uses.
ELECTROTECHNOLOGY	
Antennas	Our expertise covers all specified branches, except power and signal transmission devices.
ENVIRONMENTAL POLLUTION AND CONTROL	
Solid Wastes Pollution and Control	Thermoradiation of sewage sludge for fertilizers and feedstocks.
Radiation Pollution and Control	Part of our Safeguards Program.
Environmental Health and Safety	A line function over the entire laboratory.

APPLICATION AREA	EXPERTISE
Detonations, Explosion Effects, and Ballistics	Full spectrum of capabilities.
Fire Control and Bombing Systems	Full spectrum of capabilities.
PHOTOGRAPHY AND RECORDING DEVICES	
Holography	Used only as an analytic and diagnostic tool.
Photographic Techniques and Equipment	Used only as an analytic and diagnostic tool.
PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS	
Environment	As evaluated for interaction with our projects.
Transportation	Full line of technology as applied to weapon and reactor fuel shipments.
TRANSPORTATION	
Safety	As one of principal concerns in weapon and reactor fuel shipments.
Security	As one of principal concerns in weapon and reactor fuel shipments.

CONTACT:
G. Corry McDonald
Technology Utilization Program
Sandia Laboratories - 9636
Albuquerque, New Mexico 87115
Telephone: (505) 264-1947, or
FTS 475-1947

SOUTHERN FOREST EXPERIMENT STATION
Forest Service, USDA
New Orleans, Louisiana

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Research Program Administration and Technology Transfer	Technology transfer.
NATURAL RESOURCES AND EARTH SCIENCES	
Forestry	Information on all aspects of forestry.

CONTACT:
Nelson S. Loftus, Jr.
Planning and Application AD
Southern Experiment Station
U.S. Forest Service
Room T-10210
U.S. Postal Service Bldg.
701 Loyola Avenue
New Orleans, La. 70113
Telephone: (504) 589-6712

TARADCOM
(Midwest Region)

U.S. ARMY TANK-AUTOMOTIVE RESEARCH & DEVELOPMENT COMMAND
Warren, Michigan 48090

APPLICATION AREA	EXPERTISE
ELECTROTECHNOLOGY	
General	Vehicle electrical systems.
ENERGY	
Heating and Cooling Systems	For military vehicles.
Engine Studies (Energy Related)	Monitoring of vehicle performance characteristics.
ENVIRONMENTAL POLLUTION AND CONTROL	
Air Pollution and Control	Emission controls for vehicles.
Noise Pollution and Control	For Army tactical and logistic vehicles.
INDUSTRIAL AND INFORMATION SCIENCES	
Environmental Engineering	High temperature (hot/cold) characteristics of vehicles.

CONTACT:
Ralph Trese, Consultant
U.S. Army Tank-Automotive Research
and Development Command
ATTN: DRDTA-RGR
Warren, Michigan 48090
Telephone: (313) 573-2319

TRANSPORTATION SYSTEMS CENTER
Cambridge, Massachusetts 02142

APPLICATION AREA	EXPERTISE
COMMUNICATION	
General	Development in the areas of command and control technology for advanced transportation systems.
ENERGY	
Energy Use, Supply and Demand	Develops alternatives for transportation energy conservation.
ENVIRONMENTAL POLLUTION AND CONTROL	
Air Pollution and Control	Developed data base management system for transportation air pollution studies; designed computer models of nationwide transportation-generated air pollution; performed air pollution dispersion tests.
Noise Pollution and Control	Developed and applied noise measurement analysis techniques to construction equipment, diesel-electric locomotives, lightweight rail cars, highway vehicles, mass transit wheel/rail equipment.
PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENT	
Transportation	Research, development and analysis of new transportation systems.
Energy	Development of techniques to reduce fuel consumption.
TRANSPORTATION	
Air Transportation	Plans, evaluates and develops future systems for air transportation.
Metropolitan Rail Transportation	System management and technical capability for evaluating and improving the safety and productivity of the nation's ground transportation.

APPLICATION AREA	EXPERTISE
Transportation Safety.	Performs research, development and assessment of the safety for all forms of transportation.
Pipeline Transportation.	Assessment of nations's capacity for transporting oil, coal and natural gas.
Global Navigation Systems. . . .	Aeronautical and marine satellite applications to improve traffic control.
Marine and Waterway Transportation	Exploration of advanced technologies as they apply to marine systems.
Road Transportation.	Supports the Federal Highway Administration and Urban Mass Transportation Administration in improving and expanding existing systems and assessment of innovative transportation systems.
Railroad Transportation.	Supports the Federal Railway Administration in research and development of systems.
General.	All modes of transportation are included in the research, development, and improvement activities.

URBAN AND REGIONAL TECHNOLOGY AND DEVELOPMENT

Transportation and Traffic Planning	Provides support for the nation's ground transportation and the Urban Mass Transportation Administration.

CONTACT:
Mr. R. V. Giangrande
Transportation Systems Center
Department of Transportation
Mail Code 15
Kendall Square
Cambridge, Massachusetts 02142
Telephone: (617) 494-2486

U.S. GEOLOGICAL SURVEY
Menlo Park, California

APPLICATION AREA	EXPERTISE
ASTRONOMY AND ASTROPHYSICS	
Astrogeology	Analysis of the composition and history of the planets.
ATMOSPHERIC SCIENCES	
Monitoring	Applications of remote sensing.
DETECTION AND COUNTERMEASURES	
Seismic Detection	Determining how to predict the time and intensity of earthquakes and control them through the gradual release of strain.
ENERGY	
General	Supervision of energy industry operations to ensure safe and efficient operation, protection of the environment, maximum efficient recovery of the product.
Geothermal Energy	Classification and evaluation of geothermal lands.
NATURAL RESOURCES AND EARTH SCIENCES	
Cartography	Provides maps showing the configuration of the land surface, location of man-made features and present land use.
Geology and Geophysics	Earthquake studies, environmental geology, energy resources, mineral resources, geochemistry and geophysics.
Hydrology and Limnology	Hydrologic studies and areal appraisals of water resources are directed toward solutions to such problems as ground water contami-

APPLICATION AREA	EXPERTISE
	nation, and understanding the physical and hydrologic framework of an entire watershed.
Mineral Industries	Provides information on rock composition and structure for prospecting of minerals.
Natural Resource Surveys	Appraisal of the lands' potential energy and mineral resources.
OCEAN TECHNOLOGY AND ENGINEERING	
Marine Geophysics and Geology	Studies of the Continental Shelf and the ocean floor to provide information on the mineral and energy resource potential and environmental characteristics of the submerged lands.

CONTACT:
Mr. George E. Robinson
U.S. Geological Survey
345 Middlefield Road
Menlo Park, CA 94025
Telephone: (415) 323-8111, ext. 2711

WALLOPS FLIGHT CENTER
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Wallops Island, Virginia 23337

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Research Program Administration and Technology Transfer	Research and development planning, contract management, technology transfer program.
AERONAUTICS AND AERODYNAMICS	
Aircraft	Surveillance, mapping, satellite underflight, sensor research.
Airports	Airport-aircraft interface, air traffic control, avionics systems technology, noise reduction technology, airport environmental studies, high speed turn-off techniques, approach and landing systems, and airport configuration.
General	Aircraft spin, cross-wind landings, pilot performance, procedures and aides at uncontrolled airport and safety.
ATMOSPHERIC SCIENCE	
Meteorological Data Collection, Analysis and Weather Forecasting	Atmospheric dynamics, densities and winds as measured from satellites, rockets and balloons. Ozone measurements a specialty.
ELECTROTECHNOLOGY	
Antennas	Design, applications and operations.
Electromechanical Devices	Payload instruments.
Telemetry	Design, applications and operations. Instrumented vans.

APPLICATION AREA	EXPERTISE
OCEAN TECHNOLOGY AND ENGINEERING	
Dynamic Oceanography	Study of waves, currents, tides and air-sea interaction.
ORDNANCE	
Rockets	Building up rockets, handling and launching.

CONTACT: Gilmore H. Trafford
Technology Utilization Officer
Wallops Flight Center
Wallops Island, Virginia 23337
Telephone: (804) 824-3411, ext. 201
FTS: 928-5201

U. S. ARMY ENGINEER WATERWAYS EXPERIMENT STATION
Vicksburg, Mississippi 39180

APPLICATION AREA	EXPERTISE
ADMINISTRATION	
Computer Application	Hardware and software development; data communications network (WESNET); systems support; interactive graphics; applications and analysis; coding; ADP training; systems evaluation.
Management Information	Management Information System (MIS).
Research Program Administration and Technology Transfer	Conceives, plans, and executes research and development studies in support of civil and military missions of the Chief of Engineers; publishes results of research studies; maintains formal exchange agreements with foreign and domestic agencies; operates DoD Information Analysis Centers for Pavements and Soils Trafficability, Concrete Technology, Hydraulic Engineering, and Soil Mechanics; maintains extensive scientific and engineering reference library and Engineering Computer Programs Library.
AERONAUTICS AND AERODYNAMICS	
Airports	Diversified and accelerated pavements research; design and evaluation of pavements; research on flexible, rigid, reinforced, fibrous, and prestressed concrete pavements systems; flexible overlays, joints, and joint sealers; design of paving mixes; total thickness design; compaction requirements and related aspects; theoretical pavement studies; investigations of expedient surfacing materials for military airfields; rapid repair.

APPLICATION AREA	EXPERTISE
Test Facilities and Equipment	Well equipped testing laboratory; WES-developed gyratory compactor; special field facilities; construction equipment; special load carts with specific landing gear configurations; WES model testing apparatus for scale-model pavement tests; instrumentation monitoring devices; nondestructive test procedures; construction materials; concrete materials; repair materials.
General	Pavement design, construction, and evaluation; research in areas of new techniques in airfield construction; expedient surfacing materials/systems investigations; structural surfaces research; membrane systems research; surface preparation research; dust-control research; review of Army Facilities Component System; stability analyses of concrete structures.
ATMOSPHERIC SCIENCES	
Meteorological Data Collection, Analysis, and Weather Forecasting	Collection and analysis of hydrologic and climatological data as related to specific projects; local weather station; marine data hind-casting; lake data hind-casting; estimation of extremes.
BUILDING INDUSTRY TECHNOLOGY	
Architectural Design and Environmental Engineering	Engineering and construction services for design, construction, operation, and maintenance of facilities and equipment necessary to accomplish WES mission; surface finish; resistance to weathering.

APPLICATION AREA	EXPERTISE
Building Standards and Codes	Engineering design, technical specifications, engineering drawings, budget estimates, and construction inspection; plant replacement and improvement programs (internal); standards in all fields of concrete construction, plain, reinforced, prestressed; standards for acceptance of construction materials.
Construction Management and Techniques	Management of all construction projects at WES relative to project studies; recommended practices for concrete construction.
Structural Analyses	Physical and mathematical model studies to verify, refine, and/or develop the plan, design, operation, and maintenance of all types of hydraulic structures; stability analyses of concrete structures; analyses of concrete dams; analyses of soil/structure interaction; structural design of plain and reinforced concrete structures.
General	All in-house construction as required to accomplish WES missions.
CHEMISTRY	
Analytical Chemistry	Chemical analysis of concrete and concrete materials in fully equipped chemical analysis laboratory; methods of analysis of inorganic nonmetallic materials, especially cement, rock, soil, and clay; environmental engineering; contaminants parts-per-billion range; microbiological, chemical, and radioisotope tracer studies; climatic-controlled greenhouses; environmental chambers.
Industrial Chemistry and Chemical Process Engineering	Chemical processes in cement hydration and alteration.

APPLICATION AREA	EXPERTISE
Physical and Theoretical Chemistry	Physical chemistry of inorganic nonmetallic colloidal systems such as clay and portland cement.
Polymer Chemistry	Polymers in concrete inpregnation and as protective coatings for concrete.
CIVIL ENGINEERING	
Civil Engineering	Soil mechanics; rock mechanics; pavements; engineering geology; earthquake engineering; soil and terrain mobility and trafficability; terrain analysis; remote sensing; hydraulics; structures.
Construction Equipment, Materials, and Supplies	Testing construction equipment for offroad mobility; equipment and materials for pavements and expedient surfacing; landing mats; membranes; earthwork; compaction; cement; aggregate; soils; sand; gravel; crushed stone; pozzolan; reinforcing steel; bituminous concrete; precast concrete; rock; grout; mortar; organic additives; polymeric materials.
Earthquake Design	Dynamic properties of soils; stability calculations; embankment design; liquefacation; dynamic properties of mass concrete.
Flood Control	Use of physical and mathematical models for research; dams and channels; study of hurricane surges and tsunamis.
Highway Engineering	Compaction control; pavement design; membrane encapsulation and membrane underlay; durability and performance of material used in rigid pavements; vehicle mobility.

APPLICATION AREA	EXPERTISE
Hydraulic engineering.	Use of physical and mathematical models; design criteria; rivers; harbors; dams; locks; estuaries; wave action; riverine morphology; circulation; tides; sedimentation; hydraulic structures; field testing.
Soil and Rock Mechanics.	Embankment and foundation design; stability; seepage; excavation; characterization of clays; mechanical properties of rocks.

COMMUNICATION

Graphics	Interactive graphics; data such as design parameters, feature descriptions, stresses, etc. may be entered in the Tektronix 4012 and 4014 graphic display terminals resulting in a three-dimensional image of the structure under evaluation; other graphics hardware: hard-copy unit, audio recorder, interactive graphics tablet; skilled staff of engineers, mathematicians, physicists, and programmers to assist in computer applications; engineering graphics and illustrating: structural and mechanical drawing, topographical, geological, and environmental maps, and aerial mosaics; printing of technical reports and documents, charts and multicolored maps.

COMPUTERS, CONTROL AND INFORMATION THEORY

Computer Hardware.	One Texas Instruments ASC computer system; one G-635 computer system; one G-437 computer system; graphics terminals; inquiry retrieval terminals; remote batch terminals; plotters (off-line).
Computer Software.	Programming; process control; data analysis; mathematical modeling.

APPLICATION AREA	EXPERTISE
Information Processing Standards	WES Automatic Data Processing (ADP) Center Programmer's Handbook (loose-leaf) furnished to assist ADP Center's customers in using the system to best satisfy their requirements; ADP Center sponsored training courses (for Federal employees only) such as "ADP Center Management in the Corps of Engineers," "GE-200 and GE-400 Systems and Operations," "FORTRAN Programming," "Computer Graphics," etc.; technical manual library.
Pattern Recognition and Image Processing	Aquatic plant management; terrain analysis; camouflage; remote sensing techniques.

DETECTION AND COUNTERMEASURES

Acoustic Detection	Personnel and vehicle detection and classification.
Electromagnetic and Acoustic Countermeasures	Personnel and vehicle detection systems.
Infrared and Ultraviolet Detection	Archaeological site detection; roof maintenance aids; comouflage.
Magnetic Detection	Personnel and vehicle detection.
Optical Detection	Camouflage; environmental constraints; terrain analysis.
Personnel Detection	Design of seismic, acoustic, and magnetic detection systems.
Seismic Detection	Design of personnel and vehicle detection systems.
General	Personnel and vehicle detection.

APPLICATION AREA	EXPERTISE
ENERGY	
Environmental Studies	Response to environmental stress of construction materials.
Selected Studies in Nuclear Technology	Prestressed concrete nuclear reactor containment vessels; stemming and confinement of subsurface nuclear events.
ENGINEERING ASPECTS OF EQUIPMENT AND STRUCTURAL DESIGN FOR ENVIRONMENTAL PURPOSES	
Water-Resources Program	Water Resources Assessment Methodology (WRAM); Environmental Water Quality Operational Studies (EWQOS); remote sensing systems.
Confinement and Dewatering Dredging Materials	Guidelines for constructing, planning, and managing confined dredged material containment areas.
Chemical Fixation of Hazardous Wastes	Process development and laboratory and field evaluation.
Wastewater Treatment Systems	Methodology for Areawide Planning Studies (MAPS); Computer-Assisted Procedures for Design and Evaluation of Wastewater Treatment Systems (CAPDET); design, construction, and operation of small-scale wastewater treatment facilities.
ENVIRONMENTAL INVENTORIES AND ASSESSMENTS	
Engineering Modifications to Riverine Systems	Environmental impact.
Dredging and Open-Water Disposal of Dredged Material	Development of new or improved disposal practices or alternatives; possible productive uses of dredged material.

APPLICATION AREA	EXPERTISE
ENVIRONMENTAL POLLUTION AND CONTROL	
Solid Wastes Pollution and Control.	Recycling of waste concrete; use as construction materials of solid wastes such as fly ash, slag, and mine tailings; process evaluation (e.g., chemical stabilization, encapsulation, quantification of abatement procedures); evaluation of potential reuse and decontamination.
Water Pollution and Control. . .	Reservoir water quality; selective withdrawal; flushings; dispersion; heat dispersion; circulation; math modeling; criteria development; definition and quantification of nonpoint sources and transport processes of contaminants; automated data-collection methods; guidelines for waste treatment facilities at reservoirs and roadside rest areas; design and operations of small-scale wastewater treatment systems; Computer-Assisted Procedures for Design and Evaluation of Wastewater Treatment Systems (CAPDET); and Methodology for Areawide Planning Studies (MAPS).
Pesticides Pollution and Control.	Math modeling; criteria development.
Environmental Health and Safety	Studies of wastewater management and various sewerage treatment alternatives; design and operation guidelines for small waste treatment systems to bring roadside rest area facilities into compliance with PL 92-500 (Federal Water Pollution Control Act); studies of pollutant potential of raw and chemically fixed hazardous industrial wastes and flue gas desulfurization sludges as concerned with the effectiveness of commercially

APPLICATION AREA	EXPERTISE
Environmental Health and Safety (contd)	available fixation processes; domestic waste disposal studies, both urban and regional; water-quality evaluation.
Environmental Impact Statement	Impact assessment methodology: Water Resources Assessment Methodology (WRAM).
General	Functional use of natural ecosystems and specific biological and chemical processes; water-quality and ecological modeling; operation and management alternatives.
ENVIRONMENTAL RESOURCE MANAGEMENT	
Marsh Creation for Wildlife Habitats	Guidelines for use of dredged material in marsh habitat development.
Recreation Planning	Evaluation of benefits.
Fisheries Development	Impact of flood-control and power-production practices.
Water-Quality Evaluation	Water Resources Assessment Methodology (WRAM); Environmental Water Quality Operational Studies (EWQOS).
Water-Quality and Ecological Simulation Models	Environmental engineering.
Water-Resources Analysis	Water Resources Assessment Methodology (WRAM).
Land Treatment of Wastewater	Overland flow studies (laboratory and field prototype studies).
INDUSTRIAL AND MECHANICAL ENGINEERING	
Environmental Engineering	Limnology; aquatic and estuarine ecology; agricultural and sanitary engineering; aquatic and marine

APPLICATION AREA	EXPERTISE
Environmental Engineering (contd)	biology; botany; zoology; soil microbiology; environmental chemistry; forestry; fisheries; wildlife management; reservoir water quality; recreation; resource planning.
Hydraulic and Pneumatic Equipment	Sump pumps.
Nondestructive Testing	Nondestructive evaluation of concrete structures and elements of all sizes and shapes using optical, velocity, vibration, and impact techniques; physical model testing; prototype testing.
Plant Design and Maintenance	Design and maintenance of pumping plants; jet pumps.

LIBRARY AND INFORMATION SCIENCE

APPLICATION AREA	EXPERTISE
Information Systems	Access to Department of Defense's automated RDT&E data base at Defense Documentation Center (DDC), Alexandria, Virginia, and access to Lockheed's DIALOG System at Palo Alto, California; support for WES Soil Mechanics and Pavements and Soils Trafficability Technical Information Analysis Center in constructing an automated data base in Geotechnical Engineering.
Marketing and User Services	Literature searches on DDC and Lockheed Systems for patrons of Technical Information Center (TIC) at WES.
Operations and Planning	Use of WES ADP Center's GE computer for automated reports distribution lists, library circulation lists, and internal Management Information System.
Personnel	Use of WES ADP Center's GE computer for automated personnel records, personnel training information, etc.

APPLICATION AREA	EXPERTISE
Reference Materials	Technical Library collection numbering over 200,000 items, including books, technical reports, periodicals, reprints, and 3 types of microform; catalogs on file for eleven other large libraries; access to DDC and Lockheed data bases.
Environmental Resource Data Analysis	Water Resources Assessment Methodology (WRAM); Computer-Assisted Procedures for Design and Evaluation of Wastewater Treatment Systems (CAPDET); Methodology for Areawide Planning Studies (MAPS).
General	Continuing use and evaluation of automated data bases; participant in Federal Library Network Prototype Project; investigation of ways and means of faster document delivery via telecommunication, specifically slow-scan television, telefacsimile, and satellite.
MATERIALS SCIENCES	
Ceramics, Refractories, and Glass	Physical, chemical, mechanical, and performance research on cements, concretes, glasses, and rocks.
Coatings, Colorants, and Finishes	Acid-resistant, abrasion-resistant, and architectural coatings for mortars and concretes.
Composite Materials	Performance and evaluation tests of pavements and expedient surfacing for roads and airfields; fiber-reinforced cement in concrete, concrete mortar, reinforced concrete, prestressed concrete.
Corrosion and Corrosion Inhibition	Sea water attack on concrete and reinforcing steel; prevention of corrosion of prestressing steel.

APPLICATION AREA	EXPERTISE
Elastromers	Performance and evaluation tests of pavements and expedient surfacing for roads and airfields; rubber and plastic waterstops for concrete structures.
Fibers and Textiles	Performance and evaluation tests of pavements and expedient surfacing for roads and airfields; steel, glass, and organic fibers as used in fiber-reinforced concrete and cement.
Iron and Iron Alloys	Performance and evaluation tests of pavements and expedient surfacings for roads and airfields.
Materials Degradation and Fouling	Performance and evaluation tests of pavements and expedient surfacings for roads and airfields; resistance to degradation of inorganic nonmetallic materials, reinforcing and prestressing steel, and elastomers such as waterstops.
Miscellaneous Materials	Performance and evaluation tests of pavements and expedient surfacings for roads and airfields.
Nondestructive Testing	Performance and evaluation tests of pavements and expedient surfacings for roads and airfields; vibratory-seismic testing of pavements; nuclear moisture-density test; X-ray and nuclear interrogation of specimens; nondestructive evaluation of concrete structures and elements of all sizes and shapes using optical, velocity, vibration, and impact techniques.
Nonferrous Metals and Alloys	Performance and evaluation tests of pavements and expedient surfacings for roads and airfields.
Plastics	Performance and evaluation tests of pavements and expedient surfacings for roads and airfields; liquid film-forming

APPLICATION AREA	EXPERTISE
Plastics (contd)	resins for curing concrete; materials for polymer and bonding polymer impregnation; rubber and plastic waterstops for concrete structures.
General.	Soil tests; concrete (all areas); bituminous concrete tests; landing mat tests.
MATHEMATICAL SCIENCES	
Operations Research.	Analyst support.
MEDICINE AND BIOLOGY	
Botany	Environmental engineering.
Ecology.	Environmental engineering.
Pest Control	Evaluation of chemical, biological, and engineering procedure for mosquito control in dredged material containment areas.
Zoology.	Environmental engineering.
NATURAL RESOURCES AND EARTH SCIENCES	
Geology and Geophysics	Foundation investigations; seismic and resistivity surveys; Rayleigh wave propagation; application of mineralogy, crystallography, petrology, and petrography to aggregates, cements, and concrete.
Hydrology and Limnology.	Groundwater regimes.
Snow, Ice, and Permafrost. . . .	Terrain trafficability; surface strength prediction techniques; resistance of construction materials to freezing and thawing; phenomenology of ice formation in water-saturated porous media.

APPLICATION AREA	EXPERTISE
Soil Sciences	Soil moisture and strength prediction in trafficability studies; trafficability classification; pavement foundations; characterization of clay systems.
General	Soil and terrain trafficability; pavements and expedient surfacings; terrain analysis.

NAVIGATION, GUIDANCE AND CONTROL

Navigation Systems	Structural design, condition evaluation, and construction materials for navigation locks and port facilities; model studies using self-propelled, radio-controlled model ships for testing the navigability of locks and approaches; use of models to determine composition and positioning of lock-and-dam components, dimensions and locations of approach wall and navigation passes, etc.

NUCLEAR SCIENCE AND TECHNOLOGY

Nuclear Explosions and Devices	Underground and underwater explosion phenomology and effects; investigation of air blast, ground shock, cratering, and ejecta produced by subsurface explosions; effects of explosions on structures.
Nuclear Instrumentation	Research aimed at upgrading existing sensors and electronic systems; development of sensors, systems and placement methodology; electronic recording equipment and high-speed motion picture photography used in data acquisitions.
Radiation Shielding, Protection and Safety	Development of guides to assist in controlling explosive effects during civil-type evacuation programs; design of protective structures; minimization

APPLICATION AREA	EXPERTISE
Radiation Shielding, Protection and Safety (contd)	of safety hazards involved with underground storage of explosives; high-density aggregates in concrete.
Radioactive Wastes and Radioactivity	Concrete production for encapsulation and stemming in connection with underground disposal.
OCEAN TECHNOLOGY AND ENGINEERING	
Dynamic Oceanography	Study of wave dynamics, particularly by means of models; air/sea interaction; hurricane surges; tsunamis; wind-driven circulation; model studies for prevention of shoaling in offshore and entrance tidal channels; study of waste dispersion patterns and flushing rates.
Effects of Ocean-Dumping of Dredged Material	Evaluation; impact assessment; criteria development.
Hydrography	Hydrographic surveying systems.
Marine Engineering	Resistance of construction materials to weathering and corrosion in sea water; navigation facilities; shore and channel protection; harbor design; inlet morphology and processes.
Marine Geophysics and Geology	Bottom morphology and sediments; subbottom structure; location of materials for beach fill; use of EG&G Uniboom System, ORE Pinger System, ORE Side-Scan Sonar System; staff geologists, geophysicists, and soil engineers for consultation, presurvey assessments, and office interpretation of records.

APPLICATION AREA	EXPERTISE
Physical and Chemical Oceanography	Capable of evaluation of ecological effects and regulatory criteria of sediment and water chemistry; bioassay facilities for evaluation of lethal and sublethal effects of suspended solids and chemical contaminants on organisms; studies of openwater disposal of dredged material in respect to turbidity, water quality, aquatic ecology; instrumentation capable of rapid response to change of velocity, water temperature, dissolved oxygen, pH, turbidity, and conductivity.
Underwater Construction and Habitats	Selection of construction materials for marine constructions; structural design.

ORDNANCE

Armor	Test of weapons effects on various types of material to determine the effectiveness of the material for armor.
Bombs	Studies of the effects of various types and sizes of conventional explosives on structures and terrain features; development of a bulk-loading explosive system for military field use; use of blast load generator for simulating the pressure-time histories of blast loadings from kiloton and megaton weapons; TNT casting facility available for melting and casting explosive charges in various shapes and sizes up to 300 pounds in weight.
Combat Vehicles	Vehicle mobility tests and mobility prediction.
Detonations, Explosion Effects, and Ballistics	All aspects.

APPLICATION AREA	EXPERTISE
PHOTOGRAPHY AND RECORDING DEVICES	
Photographic Techniques and Equipment	Borehole optical tools including still photography, television, and periscopic examination; two borehole cameras (one for NX holes and one for large diameter holes); special projector; complete taping capability for television observation of openings of unlimited diameter; personnel qualified to interpret and log borehole photography are available on request.
Recording Devices	For terrain analysis, soil moisture, and strength for trafficability; pavement design and tests; pavement performance and evaluation; meteorological events.
PHYSICS	
Acoustics	Sub-bottom acoustic profile surveys to identify sources of material for beach replenishment; use of acoustic sub-bottom profilers and side-scan sonar; measurements of the acoustic environments associated with blasting, rocket launches, and various transportation vehicles; acoustic flowmeter prototype evaluation tests; acoustical geophysical surveys of cavernous areas; acoustic wave propagation analytical models for examining existing and proposed acoustic sensor systems for their performance against a variety of targets and a variety of terrain conditions.
Fluid Mechanics	Open channels; closed conduits; wave mechanics; air/sea interaction.
Optics and Lasers	Airborne laser profilometers and laser surveying devices for environmental evaluation of water quality, terrain analysis, land management problems, and hydrologic and hydrographic analyses,

APPLICATION AREA	EXPERTISE
Optics and Lasers (contd). . . .	and evaluation of unprepared landing sites; studies of effects of aquatic weeds to laser radiation; optical density characteristics of irradiated vegetation and suspended riverine material; use of nomogram for computing optical density contrasts for environmental management purposes; determination of light reflectance of concrete structures.
Structural Mechanics	All aspects.
PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS	
Energy	Design and construction of energy-related facilities.
Environment.	Terrain analysis; impact statements; reservoir water quality.
TRANSPORTATION	
Air Transportation	Rapid repair of airfields.
Marine and Waterway Transportation	Structural design, condition evaluation, and construction materials for navigation locks and port facilities; navigation channels and channel regulation structures; traffic simulation; bankline protection.
Offroad Mobility or Transportation	Test and evaluation of vehicle mobility.
Railroad Transportation.	Evaluation of concrete structures, bridges, and crossties.
Road Transportation.	Vehicle mobility; pavements; structural design; material selection; performance evaluation; concrete in pavements; bridges.

APPLICATION AREA	EXPERTISE
PHOTOGRAPHY AND RECORDING DEVICES	
Photographic Techniques and Equipment	Borehole optical tools including still photography, television, and periscopic examination; two borehole cameras (one for NX holes and one for large diameter holes); special projector; complete taping capability for television observation of openings of unlimited diameter; personnel qualified to interpret and log borehole photography are available on request.
Recording Devices	For terrain analysis, soil moisture, and strength for trafficability; pavement design and tests; pavement performance and evaluation; meteorological events.
PHYSICS	
Acoustics	Sub-bottom acoustic profile surveys to identify sources of material for beach replenishment; use of acoustic sub-bottom profilers and side-scan sonar; measurements of the acoustic environments associated with blasting, rocket launches, and various transportation vehicles; acoustic flowmeter prototype evaluation tests; acoustical geophysical surveys of cavernous areas; acoustic wave propagation analytical models for examining existing and proposed acoustic sensor systems for their performance against a variety of targets and a variety of terrain conditions.
Fluid Mechanics	Open channels; closed conduits; wave mechanics; air/sea interaction.
Optics and Lasers	Airborne laser profilometers and laser surveying devices for environmental evaluation of water quality, terrain analysis, land management problems, and hydrologic and hydrographic analyses,

APPLICATION AREA	EXPERTISE
Optics and Lasers (contd). . . .	and evaluation of unprepared landing sites; studies of effects of aquatic weeds to laser radiation; optical density characteristics of irradiated vegetation and suspended riverine material; use of nomogram for computing optical density contrasts for environmental management purposes; determination of light reflectance of concrete structures.
Structural Mechanics	All aspects.
PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS	
Energy	Design and construction of energy-related facilities.
Environment.	Terrain analysis; impact statements; reservoir water quality.
TRANSPORTATION	
Air Transportation	Rapid repair of airfields.
Marine and Waterway Transportation	Structural design, condition evaluation, and construction materials for navigation locks and port facilities; navigation channels and channel regulation structures; traffic simulation; bankline protection.
Offroad Mobility or Transportation	Test and evaluation of vehicle mobility.
Railroad Transportation.	Evaluation of concrete structures, bridges, and crossties.
Road Transportation.	Vehicle mobility; pavements; structural design; material selection; performance evaluation; concrete in pavements; bridges.

TECHNOLOGY TRANSFER EXAMPLES

ADMINISTRATION

Inventory Control

The Construction Engineering Research Laboratory has developed an inventory control system for operation of commissaries in the U.S. Army.

Management Practice

Construction Engineering Research Laboratory has developed zero-budgeting for operation and maintenance activities for operating and maintaining navigable rivers in the United States.

Research Program Administration and Technology Transfer

Los Alamos Scientific Laboratory has pioneered the development of Industrial Staff Member programs, permitting industrial scientists and engineers to work at LASL for extended periods of time, for direct person-to-person technology transfer.

Personnel Management, Labor Relations, and Manpower Studies

The Armed Services Vocational Aptitude Battery (ASVAB) has been used in high schools for civilian occupational counseling as well as armed services recruiting.

AERONAUTICS AND AERODYNAMICS

NADC has assisted the U.S. Customs Service in the definition, design and development of a prototype aircraft system to counter air smuggling across U.S. borders.

NADC is assisting the U.S. Coast Guard in performing system definition and integration of an airborne multisensor system including electro-optics radar photo, to be used for multi-purpose missions including search and rescue, environmental protection, enforcement of laws and treaties.

AGRICULTURE AND FOOD

Agricultural Equipment, Facilities, and Operations

Los Alamos Scientific Laboratory is developing for the USDA an implantable transponder used for animal identification and temperature monitoring. A company has been organized to commercialize this technology.

Animal Husbandry and Veterinary Medicine

The USDA is supporting a program at the Los Alamos Scientific Laboratory to develop rapid disease diagnosis techniques for animals and meat. LASL developed techniques for local application of heat for tumor therapy. This technique has been successfully applied to treatment of domestic, farm and zoo animals.

Fisheries and Aquaculture

Naval Ocean Systems Center conducted experiments on the farming of seaweed which could be harvested, dried and burned as a fuel source.

Food Technology

Army Natick Research and Development Command prepared a proposal and provided consultation to the San Diego School System on their school lunch program. Consumer evaluation and preferences for food items and menus have been developed and applied extensively to military feeding systems. These techniques have been provided to the San Diego School System for evaluation of student food preferences and frequencies in order to increase student participation and decrease food wastes.

ATMOSPHERIC SCIENCES

Meteorological Instruments and Instrument Platforms

The Department of Transportation sponsored data acquisition operations at the Los Alamos Scientific Laboratory for climate impact assessment.

Weather Modification

The Naval Weapons Center has developed a small diameter pyrotechnic catalyst generator and an airborne dispenser to be used for the National Oceanic and Atmospheric Administrations' Project Stormfury.

Pyrotechnic generators and cloud-seeding methods originated at NWC are employed in rain-making to relieve droughts throughout the world.

BEHAVIOR AND SOCIETY

General

The Construction Engineering Research Laboratory has developed a procedure for having the physical space serve as a facilitator to the occupants in the use of the space in performing his functions. The procedure has been used for a large-scale office complex for FAA, the office of the Civil Works Directorate of the U.S. Army Corps of Engineers, in dining facilities for all three services, and for research stations in research laboratories for both the Navy and the Army.

Job Training and Career Opportunities

Functional job-reading training courses have been developed for a number of Military Occupational Specialties (MOS), to enable marginally literate trainees to acquire job-related reading skills.

Organizational Psychology

The RIBSS has provided technical advisory service to various Army commands and agencies on utilization and evaluation of Organizational Effectiveness strategies, and has developed leadership/management workshops for application in Army units.

Social Concerns

RIBSS-developed research instruments have included an index for measuring over/under representation of women and minority groups in the Army, a sex-role attitude scale, and a Racial Awareness and Perceptions Survey.

Education, Law, and Humanities

RIBSS has developed training programs for training managers and trainers in the employment of performance-based techniques to train and evaluate individual performance in the unit. Related ARI-developed literature includes a criterion-referenced test construction manual, a guidebook for the development of Army training literature, and a manual on how to apply systems engineering methods to unit training and evaluation.

BIOMEDICAL TECHNOLOGY AND HUMAN FACTORS ENGINEERING

Biomedical Instrumentation and Bioengineering

The Naval Ocean Systems Center has developed a new head controller for wheelchair users which provides variable speed and turning rates for the chair. They also built a scale for weighing burn patients in bed, a blood pressure monitor for real-time blood pressure readings, a wheelchair which allows paralyzed persons to stand.

Naval Air Development Center has loaned specialized equipment for cancer research projects at the Institute of Cancer Research; provided information and resource assistance on the health hazard and possible solution to the problems of waste anesthetic gases to a group of area hospitals; determined the physiological effects on man breathing 100 percent oxygen for extended periods; measured the effects of linear and angular acceleration on human performance for NASA.

NADC has designed and tested a new vehicle occupant restraint system which inflates upon impact and includes lap and shoulder harnesses which resemble conventional restraint systems in their uninflated state. Upon impact an inflatable bladder attached underneath a restraint strap inflates and acts to cushion the pelvis and chest areas against the forces of collision. The system has been successfully demonstrated at NASA's Langley Research Center. NADC designed, tested and delivered cold water survival equipment to the U.S. Coast Guard as part of the ship Escape Survival and

Rescue Detection system for Great Lakes Water shipboard operations. NADC conducted the research that eventually led to the development of thermal protective clothing using NOMEX fibers. This technology was soon adopted by the textile industry for the manufacture of underclothing, flight suits, overalls, fireman's turnout coats, hospital linen and racing driving suits. NADC has an on-going program of fundamental and applied biomedical research which has led to new components and methodology for the detection and reversal of the degeneratives and terminal effects of ischemic anoxic stress.

The Chemical Systems Laboratory has developed the mouth-to-mouth resuscitation method used throughout the world.

Chemical Systems Laboratory has developed nerve gas derivatives that are being used to treat glaucoma.

Lewis Research Center applied expertise in satellite and spacecraft communications to the preparation of specifications and the selection of equipment for a vital signs RF telemetry system linking Fairview General Hospital in Cleveland, Ohio, with nearby suburban fire department rescue squads.

NASA's John F. Kennedy Space Center engineers have developed a method which may enable doctors to detect early stages of breast cancer and to determine the likelihood that a woman will ever develop breast cancer.

This experimental technique for early cancer detection is a product of X-ray enhancement -- the ability of computers to enhance or make more visible information from X-rays not ordinarily detectable by the human eye.

Human Factors Engineering

The Naval Ocean Systems Center conducted an anthropometric study of 3,000 police officers in the U.S. for National Bureau of Standards. This will give equipment designers more current data on size and dimensions of law enforcement personnel in the U.S.

A technique developed by NOSC for using a computer to measure brain wave patterns developed by seeing a target is now used to test visual and auditory defects in children at a local San Diego hospital.

Life Support Systems

Los Alamos Scientific Laboratory conducts training sessions on the proper choice and use of respirators; these are held throughout the country for industry and government.

BUILDING INDUSTRY TECHNOLOGY

Architectural Design and Environmental Engineering

In architectural design, Construction Engineering Research Laboratory has developed techniques to determine user needs and preferences in maintaining sociological, psychological, and physiological considerations.

Construction Management and Techniques

In construction management and techniques, Construction Engineering Research Laboratory has developed a computer-based network planning tool for use by the U.S. Army Corps of Engineers and a manual on Impact of Change-Orders for use by negotiators in assessing costs resulting from changes in project scope or construction conditions after award of the contract. Numerous examples of the evaluation of construction materials, components and equipment have been provided to Army and Air Force installations for floors, furnishings, roofing systems, plastics, etc.

Building Standards and Codes

David Taylor Naval Ships Research and Development Center determined the fire resistance of selected merchant marine cables to improve fire standards.

CHEMISTRY

Analytical Chemistry

Lewis Research Center, working with Stanford Research Institute and Chicago State University, has adopted an ultrasonic cavitation metallographic analysis technique to the restoration of serial numbers illegally ground off metal objects such as guns and engines. The process has been disseminated for use by law enforcement agencies.

CIVIL ENGINEERING

Civil Engineering

The Construction Engineering Research Laboratory has developed the specifications for fibrous reinforced concrete for use in pavement slabs and in beams in building construction. This material in some applications has life-cycle cost improvements in an order magnitude of 10:1 over the competitive portland cement concrete.

COMMUNICATION

Radio and Television Equipment

Naval Ocean Systems Center personnel assisted the Palo Indian Tribe in designing a cable TV system for use on the Palo Reservation. Equipment was purchased and installed by the Indians.

The Forest Fire Laboratory has evaluated and demonstrated land mobile, frequency-synthesized transceivers, and developed telemetry and television air-to-ground transmission systems.

The Boise Interagency Fire Center has field radio caches which can be made available within hours to any location in the country. Also developed are telemetry and infrared image transmission systems.

The Institute for Telecommunication Sciences has designed a communication system for the U.S. Forest Service that will provide command/control and data relay for up to five simultaneous forest fire incidents. The system will interface Forest Service communication with the State of California and local government groups involved in fire fighting activities.

Communication and Information Theory

RIBSS scientists have developed specialized computer software and interfaces between computers and graphics terminals to study information flow and man-machine interaction in battlefield information systems; for example, the use of graphics to encode tactical data for purposes of command and control.

COMPUTERS, CONTROL AND INFORMATION THEORY

Computer Software

In computer software, Construction Engineering Research Laboratory has developed a computer-aided hospital equipment maintenance system which is in use at the Eisenhower Hospital at Fort Gordon, Georgia. This system is expected to convert operation and maintenance personnel from a 90 percent catastrophic maintenance posture to an 80 percent preventive maintenance posture.

The Naval Underwater Systems Center's PERT TIME/COST system is one of the most powerful Program Evaluation and Review Technique Systems in existence. Its multiproject scheduling and resource-tracking algorithm and cost-schedule-planning and control device can accommodate several projects simultaneously. The system has been used extensively for the management of Navy projects and has been transferred to non-DoD agencies and to some U.S. industrial firms.

General

Los Alamos Scientific Laboratory developed a data base management system for the Museum of New Mexico.

BNL has conducted research related to the utilization of large computers, computer graphics, statistics, scientific applications of computers, data base management and digital design automation.

DETECTION AND COUNTERMEASURES

Infrared and Ultraviolet Detection

The Boise Interagency Fire Center has available for use airborne infrared detection and mapping systems with imagery reproduction, recording and transmitting capabilities.

Optical Detection

The Naval Weapons Center developed a device to measure the height of trees and stem diameters.

Personnel Detection

Mobility Equipment Research and Development Command's extensive multi-disciplinary research concerned with the detection of land mines and tunnels has produced a variety of useful spinoffs. Examples are a highly specific mail-bomb detector; advanced electromagnetic techniques for the detection of plastic pipe which is now widely used for gas, water, and sewer distribution systems; and the exploitation of canines for specific law enforcement tasks. Canine selection, training, and handling manuals are currently being prepared and will be available for use by civilian agencies. Consultant services on state-of-the-art detection technology are being provided to the Department of State, the U.S. Postal Service, and Police Departments of numerous communities across the United States.

The Naval Ocean Systems Center designed a doppler radar for base perimeter security which can pick up walking people or slow moving vehicles. This device is ideal for use by law enforcement agencies who want to know if a given area has been penetrated.

ELECTROTECHNOLOGY

Optoelectronic Devices and Systems

Sandia Laboratories has patented and released several generations of electro-optic devices using quadratic PLZT ceramic elements for information storage and display techniques. These may be obtained through non-exclusive license through ERDA.

Power and Signal Transmission Devices

Civil Engineering Laboratory has developed a device to detect and monitor fluctuations in the power supply to sensitive apparatus such as communications equipment and computers. This device is now being manufactured and sold commercially. A follow-up device that promises to be of equal or even greater value is an electrical transient direction detector which can identify whether the disturbance is caused by the power source or the load.

ENERGY

Batteries and Components

Lewis Research Center developed and demonstrated highly rechargeable nickel-zinc batteries whose relative energy density doubles the operating range of U.S. Postal System electric mail delivery vehicles and other electric automobiles.

Energy Use, Supply and Demand

BNL has conducted technological, economic, and biomedical assessments of regional, national, and international energy systems; energy policy analysis; and energy problems of developing nations. They have established a major data base, energy network simulator, and optimization models for U.S. energy system.

Forest Service Research has developed techniques to help forest industries become energy self sufficient.

Working with the Philadelphia Mayor's Science and Technology Advisory Council, the Technology Transfer Office at NADC, Warminster, PA, initiated and coordinated an infrared flyover of portions of Philadelphia and Warminster to detect heat loss from buildings and houses.

Electric Power Transmission

Especially noteworthy are the Mobility Equipment Research and Development Command's efforts to help alleviate the energy crisis. The introduction of methanol fuel and the development of novel energy conversion devices based on fuel cell photovoltaic technology are of substantial value to the civilian community. Other spinoffs involve electric vehicle propulsion technology, improved electric conductors made from noncritical materials, and improved efficiency of electric power sources through the use of ceramic components and advanced, solid-state electronics.

Los Alamos Scientific Laboratory is discussing with Consolidated Edison and EPRI, the possibility of installing a superconducting dc transmission line on Long Island in the early 1980's.

Fuels

The Naval Weapons Center has successfully developed for the EPA a method for converting municipal solid waste to polymer gasoline.

NOSC has been working on techniques to conduct aerial surveys of uranium deposits.

Solar Energy

Construction Engineering Research Laboratory has developed universal curves which quickly provide a design on the economic life-cycle cost of solar energy heating and cooling as a supplemental or total energy source in all regions of the country. In energy use supply and demand CERL has developed a system for metering all users in typical Army facilities and reducing this data to supply and demand curves. CERL has also developed an innovative program for matching performance of facilities as an energy consuming unit with capacity and economics of alternate sources of energy supply and of distribution and control systems in both retrofitting old facilities and constructing new facilities. CERL has also developed economic evaluation of refuse derived fuel as a supplementary fuel for use in military installations.

A mechanical device engineer at the Naval Underwater Systems Center has been assigned (via the Intergovernmental Personnel Act of 1970) to the State of Connecticut Department of Planning and Energy Policy as a technology agent. The agent will assist in the fields of solar energy and energy conservation and will help to design and implement training programs in solar energy.

Los Alamos Scientific Laboratory has developed, for the Pacific Region, a handbook for architects, builders and consumers on optimal solar heating system design.

ERDA is supporting the testing of large heliostats at NWC for use in a solar thermal conversion program.

Swimming pool heating by solar energy--NOSC worked with the City of San Diego on this successful project.

Lewis Research Center, for DOE, built and demonstrated solar cell power sources for weather stations, navigation buoys, refrigerators, ranger's lookout stations and other installations where conventional electric power sources are not readily accessible.

377

LeRC, for DOE, is designing and building large wind-driven electric power generating systems, ranging in size from 100 kW to 1500 kW, for joint operation with local electric utility companies.

Miscellaneous Energy Conversion and Storage

Mobility Equipment Research and Development Command is providing technical support to the Mass Transportation Center of the Department of Transportation in the area of energy managing electromechanical transmission systems which efficiently transfer or recuperate energy between a flywheel and the vehicle wheels. The results of a study conducted by this Command are currently under active consideration for possible use in bus-type, mass-transit vehicles.

MERADCOM developed an Integrated Power Switch (IPS) which is an integrated power function that provides industry with a basic building block suitable for power conditioners in ratings to 30 kW. This building block is currently manufactured by Texas Instruments, Inc. in preproduction quantities. The IPS is utilized in evaluation quantities by several U.S. manufacturers in new equipment design and is considered for potential use in the space shuttle by NASA and Delco Electronics Co.

The Naval Weapons Center conducted a survey for ERDA to determine the usefulness of currently used heat exchangers. This agency is also supporting NWC to demonstrate the use of photovoltaics to power a remote radar site.

NOSC built a pilot marine farm and conducted experiments to determine the feasibility of converting insolation energy on an open ocean site into synthetic natural gas, foods, and other products. Analysis indicates favorable economic factors. Methane was produced by anaerobic digestion.

Geothermal Energy

NWC has provided consulting services to local city officials on geothermal exploration. Slim-hole drilling at the Coso Geothermal Area sponsored by ERDA is underway. Geothermal corrosion studies have been undertaken as a continuing task as well as institutional studies conducted for the Navy.

General

The heat pipe--a fast, passive heat transfer device--was invented at Los Alamos Scientific Laboratory and has found wide applications in such areas as heat recovery for energy conversion, temperature stabilization of industrial processes, and stabilization of the permafrost on the Alaska pipeline.

NOSC personnel are members of the Energy Advisory Board for the San Diego Unified School District and have chaired a panel at the Regional Energy Policy Symposium.

Lawrence Livermore Laboratory has been conducting studies for the State of California in assessing energy supply and demand projections for energy source development.

LLL has recently completed a compendium of background information on the energy situation in Hawaii. This profile is part of ongoing efforts to help the State assess its technological needs and to identify technologies developed here or at other national laboratories that are applicable to those needs.

LLL developed a microcomputer interface assembly to couple water flow sensors to central data logging systems for plant control at the Edward Hyatt Power Plant (California Oroville Dam). This was done in cooperation with the California Department of Water Resources. As a followup, LLL conducted a series of training courses in microcomputer system design so that, in the future, all microcomputer system design could be done by DWR project engineers themselves.

Brookhaven National Laboratory has projects in solar technology, technology transfer, hydrogen-hydride storage and utilization technology, fuel oil and natural gas combustion efficiency, energy conservation in buildings, energy chemistry and materials programs, superconductive power transmission, and nuclear reactor safety studies and nuclear materials safeguards.

ENVIRONMENTAL POLLUTION AND CONTROL

Air Pollution and Control

The Naval Weapons Center has provided the State of California with 3-dimensional sampling data of air pollutants in the Los Angeles Basin, San Joaquin Valley and other local areas through the use of an instrumented van and aircraft. High volume air samples for mass concentration are taken periodically for the local county health department.

Lawrence Livermore Laboratory has developed, in conjunction with the National Aeronautics and Space Administration Ames Research Center and the San Francisco Bay Area Air Pollution Control District (BAAPCD), a regional, photochemical air quality model suitable for use by the BAAPCD as an operational tool in its air quality control program for the San Francisco Bay area. The program was funded under the RANN program of the National Science Foundation. LLL provided the following: program definition and organization; overall program management; technical lead in model development, photochemical studies, data processing and banking; "user orientation" of the model; and preparation of documentation and a user's guide. As a result, a state-of-the-art photochemical air quality model for the San Francisco region was developed and an initial library of input data files was prepared. The model and its library was transferred to the Lawrence Berkeley Laboratory computer for independent, remote use by the BAAPCD, and the software necessary for preparation of additional data files was made available to the BAAPCD.

LLL has developed instrumentation for detecting, monitoring and analyzing atmospheric pollutants subject to regulation by Federal and State agencies. For example, LLL provided assistance in defining, organizing, and executing technical programs for microwave and X-ray fluorescence spectrometers for users like the California Air Resources Board and the National Institute of Occupational Safety and Health to measure numerous noxious gases and vapors.

BNL has conducted oceanographic and meteorological studies of the North Atlantic coast. They have also studied atmospheric pollution and acid rainfall, nuclear waste disposal, hydropyrolysis of coal, and structural polymer materials.

David Taylor Naval Ships Research and Development Center provided NASA with test facilities, support personnel and instrumentation to estimate the airframe radiated noise of a Boeing 747 aircraft during landing.

Mobility Equipment Research and Development Command is providing technical support to the EPA's Office of Noise abatement and Control in meeting its statutory requirements under the Noise Control Act of 1972. This support includes the provision of test sites, measurement equipment, and technical personnel to gather and analyze noise data for various items of equipment subject to possible ONAC regulatory actions. In addition, consultation is provided in the development of new standards and test procedures.

Lewis Research Center developed and demonstrated advanced air quality monitoring devices and systems including an automated directionally-sensitive monitoring device, contaminant analysis, and data reduction methods for the City of Cleveland, Ohio, and the EPA.

Solid Wastes Pollution and Control

Army Natick Research and Development Command conducted a symposium on 8-10 September 1975 on the "Enzymatic Conversion of Cellulosic Materials: Technology and Application." Purpose of the symposium was to communicate to industry and public agencies the current state of cellulose production and to suggest and evaluate potential applications - technology transfer. The symposium was attended by over 300 scientists, engineers, and public officials from U.S. and foreign countries.

Forest Service has developed a system by which cities can recycle their waste materials.

David Taylor Naval Ship Research and Development Command evaluated material performance in ship incinerator environments to improve the efficiency, reliability and performance of shipboard waste processing systems.

Sandia Laboratories has an ongoing project in which sewage sludge is exposed to thermoradiation to kill the pathogens so that the sludge may be used on crop-producing land or in livestock refeeding programs. A wide range of potential uses is anticipated in which low temperature pasturization is possible due to the synergistic combination of small amounts of heat and low-dose radiation. Inquiries are invited.

As a result of a request made to our representative at a state technology transfer meeting, CEEDO provided the State of Oregon with information on the treatment of corn processing wastes, rural sanitation systems and tertiary treatment of domestic wastes.

Water Pollution and Control

DTNSRDC has developed methods for enhancing existing shipboard sewage treatment systems effluent quality.

MERADCOM performed a water purification project for the city of Duluth, Minnesota to remove asbestos fibers from Lake Superior. The air-transportable unit used purifies 420 gallons per hour, 24 hours a day. It consists of an up-flow coagulation basin (ERDLator), diatomite filter, chemical feeder, pump, and 3-kW generator. Truck-mounted units have been used extensively in disaster-relief operations following floods, hurricanes, and earthquakes.

NADC aircraft and airborne infrared systems were used to detect water pollution in several local rivers under an experiment for EPA.

NOSC determined the environmental effects of siltation, dredging, sewage discharge, and ship movements on the communities of marine organisms in harbors.

NOSC determined the nutrient status of marine sediments and the impact of dredge spoils disposal.

NOSC is working on defining the possible radiological and biological implications following accidental marine deposition of radiological materials.

NOSC determined mercury content in marine sediments and in seawater in locations off the coast of Alaska.

An NOSC-developed underwater work system, the remotely controlled CURV III, was used to collect samples and make observations of the marine environment at dump sites.

NOSC determined the effects of certain marine environmental pollutants on pupping in California Sea Lions.

NOSC built and validated a portable Floating Breakwater to attenuate wave motions where protection is needed in fresh or sea water sites.

NOSC conducted aerial surveys to determine the population of bottle-nosed dolphins in the Mississippi Sound. They also worked with the Marine Mammal Commission and the National Marine Fisheries on ways to reduce porpoise kills in tuna fishing.

Noise Pollution and Control

NOSC technical personnel are on the Noise Advisory Board for San Diego City, and on the San Diego County Noise Hearing Board. These boards review and make recommendations on noise ordinances. The county board also hears appeals on ordinance violations.

NOSC technical personnel headed the National Coordinating Council on environmental noise.

NOSC has worked with the National Institute of Health (NIH) on establishing standards for impact noises.

NOSC has conducted acoustic surveys at noisy locations, e.g., airports, engine test sites, etc., and aided in the design of noise suppression devices and techniques.

General

Construction Engineering Research Laboratory has developed a computer-aided environmental impact assessment procedure for use in determining the impacts of operations such as construction, operations and maintenance and industrial production. The system addresses physical, biological, and social economic impacts as well as noise. CERL has provided specific recommendations in noise pollution, soil waste pollution and water pollution to specific Army installations in the continental United States.

Civil Engineering Laboratory is involved in developing hardware and techniques for use in the fight against pollution. CEL has discovered a method for treating oil spills.

GOVERNMENT INVENTIONS FOR LICENSING

Mechanical Devices and Equipment

Sandia Laboratories invites your non-exclusive licensed use of the following mechanical device. The rolamite principle is a combination or series of combinations of metal bands and rollers in hundreds of useful combinations. More than one hundred licenses have already been issued.

NADC has initiated a program to advertise and commercialize Navy technology through the licensing of patents.

INDUSTRIAL AND MECHANICAL ENGINEERING

Tooling, Machinery, and Tools

Sandia Laboratories has patented and developed an Interlocking Tape Joint as a means of joining cylindrical structural members such as large pipes, casings, rotary drill stems, canisters, and drums without the need for external flanges. The tape joint has been licensed since early 1976.

Manufacturing Processes and Materials Handling

Sandia Laboratories has patented and developed a solder coating system for printed circuit boards which uses superheated air to level solder and remove excess solder from plated-through holes. The solder leveller is on the market, and licensees throughout the world have made their own equipment.

Nondestructive Testing

Under Mobility Equipment Research and Development Command sponsorship, a Portable Gamma Ray Projector was developed by Technical Operations, Inc. The projector, which subsequently was marketed as a commercial product, contains an iridium isotope to generate radiation which easily passes through metal weldments exposing film placed on the far side. Once processed, the film reveals any defects within the weldment. This development has evolved into a number of commercial devices replacing much of the X-ray equipment once in common use for nondestructive inspection work.

In nondestructive testing CERL has developed the Kelly-Vail test for testing concrete in the plastic state, i.e., concrete while still in the mixing truck before placing in the form. CERL has also developed a weld-quality monitor which tests the quality of the weld while being placed. Many aspects of this technology were developed at Los Alamos Scientific Laboratory and are now used throughout the world.

LIBRARY AND INFORMATION SCIENCES

Reference Materials

Naval Ocean Systems Center library has acquired numerous, hard-to-find articles for San Diego County Sheriff's Office.

MATERIALS SCIENCES

Coating, Colorants, and Finishes

Civil Engineering Laboratory developed a simple kit for identifying the nature of weathered paints which is now being produced commercially.

NADC's experience in the development and application of powder coatings for corrosion and friction protection has assisted Bell Laboratories in the laying of telephone cables on the ocean floor. Special coatings for machine tools have been tested successfully to lengthen tool life.

Corrosion and Corrosion Inhibition

Civil Engineering Laboratory has formulated new protective systems for structures exposed to corrosion.

Fibers and Textiles

Army Natick Research and Development Command provided technical support and a transfer of technology to the U.S. Secret Service to supply their volume procurement of specialized body armor. This included Purchase Descriptions for Ballistic Kevlar Cloth, design and fabrication of prototypes and guide samples, patterns, test analysis of Kevlar prior to acceptance, inspection of cut ballistic fillers and final inspection of items.

The NYC Police Department and Baltimore Police Department were provided similar technical assistance and technology transfer to support their procurements of body armor.

The Prince Georges County Police Department received technical advice to support a pending procurement of a different type of Kevlar body armor item. New Purchase Description and prototype guide samples were provided. Technical support to provide patterns, examine pre-awarded items, and conduct inspections during the course of their contract is planned for FY 77.

Technical advice was also furnished to the Seattle, Washington, and State of Washington Police Departments in support of their body armor procurements.

The Baltimore Police Department was provided a prototype woman's body armor and requested technical assistance to measure personnel, and design and develop an acceptable Women's Ballistic Undergarment to include preparation of a full set of patterns to fit their female population. This technical support and technology transfer work was provided during FY 7T.

A major effort was conducted for the Drug Enforcement Administration for the design, development and procurement of a large quantity of specialized Ballistic Undergarments for .38-cal and .22-cal protection and for a specialized "Raid Jacket" providing 9 mm protection.

Extensive support is being provided to the FBI for the design, development and procurement of a large quantity of specialized 9 mm protective undergarments.

Project Officers and Procurement Personnel of the NYC Police Department, Baltimore Police Department, Prince Georges County Police Department, Secret Service, Drug Enforcement Administration, and FBI received educational training on the technical aspects, test analysis of material and methods for conducting quality control inspections.

Materials Degradation and Fouling

Forest Service has techniques for prevention and control of wood decay and termite problems.

Miscellaneous Materials

Construction Engineering Research Laboratory has developed numerous studies on the characteristics of materials commonly used in building construction. In addition, CERL has developed an economic forecaster on the cost of corrosion for a military installation.

Solvents, Cleaners, and Abrasives

Sandia Laboratories has patented and released a process for the preparation of odorless formaldehyde for use as a sporicide and/or disinfectant where normal formaldehyde is objectionable because of its odor. It is available on a non-exclusive licensing basis.

Wood and Paper Products

A fabric paper sandbag, knitted and woven, was developed by the Mobility Equipment R&D Command as an alternative to the cotton and jute burlap sandbag. These paper sandbags contained an organo-zinc fungicide proved immune to termite attack and exhibited useful military service life. Civilian applications for these bags are many. They were used, for instance, by Mississippi and Louisiana for flood control. The excellent resistance of these bags to termite attack indicates that this technology may provide civilian wooden structures of all kinds with the same long-term projection.

General

The development of induction-heating techniques at Los Alamos Scientific Laboratory for high-temperature metals and alloys spawned a whole industry.

FBI Laboratory applies scientific methods and techniques to the comparison examination of evidentiary materials related to criminal matters. This includes general areas of chemistry, drugs, firearms, toolmarks, explosives, physics, metallurgy, biochemistry, documents and related areas. These comparisons/examinations are conducted free of charge for all Federal agencies, U.S. Attorneys, military tribunals, and duly constituted state, county, and municipal law enforcement agencies in the U.S.

MATHEMATICAL SCIENCES

Operations Research

Naval Ocean Systems Center personnel from OR group have assisted the San Diego Police Department in establishing computer needs and consultant requirements on a large regional criminal justice computer system.

MEDICINE AND BIOLOGY

Surgery

Los Alamos Scientific Laboratory, in cooperation with the University of New Mexico Medical School, developed electrosurgical coagulating-cutting forceps.

Toxicology

The Chemical Systems Laboratory has developed a treatment for nerve gas poisoning which has application as a therapy for poisoning by parathion and other anticholinesterase compounds.

Botany

Forest Service Research has a complete program for the detection and care of tree wounds which is used by arborists, city foresters, and nurserymen.

NATURAL RESOURCES AND EARTH SCIENCES

Natural Resource Surveys

Lewis Research Center utilized airborne multispectral scanning methods to monitor strip mine area surface conditions and water pollution for the State of Ohio.

General

Construction Engineering Research Laboratory has developed a procedure for utilizing ERTS in developing a baseline of an ecology on a military installation for use in environmental impact assessment procedures.

NAVIGATION, GUIDANCE AND CONTROL

Airborne collision avoidance systems have been developed by NADC and tested for military and commercial aircraft in conjunction with FAA.

NUCLEAR SCIENCE AND TECHNOLOGY

General

BNL detects radiation with semiconductor, liquid, and gaseous detectors. Computer control and data acquisition of experiments. Medical applications of nuclear technology. Operation of the High Flux Beam Reactor and the Medical Research Reactor.

OCEAN TECHNOLOGY AND ENGINEERING

Underwater Construction and Habitats

In the ocean engineering field, the Civil Engineering Laboratory has conducted extensive studies revolving around the use of concrete in the sea. The construction and implantment of the 50-ton, unmanned SEACON structure at a 600 foot depth in the Santa Barbara Channel, which incorporated a number of significant experiments, considerably advanced the technology of seafloor construction. The use of plastic materials to fabricate a two-man capsule capable of descending to 600-feet in the ocean and providing 360 degrees visibility was demonstrated in the CEL-designed NEMO. In other ocean related projects the Laboratory has developed propellant driven anchors, pontoon lift systems for salvage work, diver heating systems and undersea diver tools. For undersea construction work, CEL participated in the development of the Buoyancy Transport Vehicle, which can function as a sea-going forklift, and the Construction Assistance Vehicle, virtually a diver-operated pickup truck.

NOSC used CURV III underwater vehicle to

a. Rescue disabled manned submersible
b. Inspect a Great Lakes Ore Carrier which had broken in two and sank in Lake Superior
c. Retrieve objects lost at sea.

Also, NOSC built and certified an inflatable recompression chamber for emergency use.

PHYSICS

Structural Mechanics

Construction Engineering Research Laboratory has the world's largest shock and vibration test machine. This machine can accommodate a load of 15 tons, accelerate it vertically to 40 *g*'s and horizontally to 20 *g*'s. The shake table has been used to evaluate the capacity of structures in seismic areas and in blast load areas. The structures test varied in size from small residence to large mechanical and electrical devices for nuclear power plants which were tested in their operational mode.

PROBLEM SOLVING INFORMATION FOR STATE AND LOCAL GOVERNMENTS

Police, Fire, and Emergency Services

Chemical Systems Laboratory produced data and studies for the development of soft body armor for police and other agencies, developed standards for hand held aerosol tear gas weapons for riot control, and developed suppressive-shielding technology for use in designing "bomb rovers" for bomb disposal squads of municipal police departments.

Lewis Research Center designed and built an inexpensive portable fire hose tester, the design of which has been provided to numerous city fire departments and manufacturers.

The Naval Underwater Systems Center has participated in a project with the New York City Police Department for the design and development of an asset management system. The system, based on NUSC's instrumentation control and plant account programs, has been operational on the New York City Police Department computer system since September 1976

An IPA assignment has been made to the New York City Police Department by NUSC. The technology agent on assignment will analyze the department's fuel dispensing system and evaluate the cost/benefit potential of automating, semiautomating and revising existing manual procedures as they relate to dispensing vehicle fuel.

The Naval Underwater Systems Center has provided communications consultation services for development of an Emergency Medical System (EMS) plan for South Central Connecticut. The EMS communications system is now operational.

An electronics engineer from the Naval Underwater Systems Center has worked with SEARCH GROUP, Inc. to examine the possibility of applying underwater communications techniques as a solution to problems posed by the bandwidth of public safety channels. Surveys of police departments have shown a definite and increasing need for speech scramblers. Technical surveys have shown that no presently available speech scramblers meet the criteria for privacy, performance and cost. As a result, a recommendation is being made to LEAA to fund a two-year program to develop a new type of scrambler that shows good potential for increased privacy and lower system cost.

Several studies have been conducted and are continuing at the Naval Underwater Systems Center under the provisions of the Intergovernmental Cooperation Act to determine adequate means by which the town of Waterford, CT can comply with federal requirements for civil preparedness.

The Naval Ocean Systems Command assisted the Poway, California fire department that had difficulties in communication from the station to vehicles due to terrain constraints. Using radiowave propagation technologies, NOSC scientists solved the problem by recommending repeated sites situated on hilltops around the city.

The Forest Fire Laboratory has developed interagency communications systems, equipment, and techniques for use with city, county, state, and federal agencies. Also, mobile communication centers and remote site communication techniques.

The Boise Interagency Fire Center has a variety of equipment capabilities, and expertise useful in wildland fire management (or other emergencies), including remote field communications, infrared systems, specialized equipment, logistics, etc.

FBI Laboratory has established research programs in forensic science areas resulting in:

1. Publication and dissemination of research results in scientific journals.
2. Presentation of research data at seminars, academic settings and forensic science meetings.
3. Publication of Crime Laboratory Digest with pertinent information distributed to local law enforcement agencies.

The FBI Laboratory conducts specialized schools at no cost for approximately 600 laboratory scientists each year. Schools are conducted at FBI Academy, Quantico, Virginia, and include general areas of scientific instrumentation, chemistry, biochemistry, and various pertinent materials sciences. Schools are designed to train police laboratory scientists in basic forensic methods/equipment and to enhance their skills and competency in individual areas of expertise.

Education

A working, dynamic model of the vocational education system of the State of Rhode Island has been developed by the Naval Underwater Systems Center to develop a unified state-wide policy for vocational education. Publication of this model as a technical document has spawned considerable interest in this program in other parts of the country.

Energy

Lewis Research Center utilized airborne multispectral scanning methods to monitor buildings and other ground facilities for places of excessive heat loss, including, for HUD, selected residential areas in Cleveland, Ohio, and Springfield, Illinois.

Los Alamos Scientific Laboratory performed a cost-benefit analysis for the State of New Mexico on proposed State construction of an intrastate gas pipeline.

Environment

The Federal Highway Administration recently published a two-volume state-of-the-art report to give highway officials and wildlife biologists the latest information on the impact of highways on wildlife populations and their habitats.

Transportation

The Federal Highway Administration developed and made ready for testing, control logic to enable systematic distribution of traffic throughout a complex corridor of parallel and interconnecting highways.

The Naval Underwater Systems Center has assisted the Urban Mass Transportation Administration (UMTA) Office of Technology Development and Deployment in research to evaluate life cycle costing (a DoD-developed technique to facilitate the identification and definition of all costs associated with each phase of a project) and the extent to which it can be utilized in urban mass transit systems.

General

Recently the Naval Underwater Systems Center has expanded its Technology Transfer Program by utilizing the mobility provisions of the Intergovernmental Personnel Act of 1970 to facilitate assignment of employees to directly assist State and local government. To date, 10 assignments have been made in the following areas: Connecticut Conference of Municipalities; Connecticut Department of Planning and Energy Policy; Rhode Island League of Cities and Towns; Rhode Island Energy Office; New York City Police Department; Mayor's Office, Kettering, Ohio; CTIP agent, Vancouver, Washington; CTIP agent, East Providence, Rhode Island; Connecticut Legislative Research Staff; and Rhode Island Department of Community Affairs.

TRANSPORTATION

Road Transportation

Lewis Research Center, for DOE, is developing the technology for practical electric automotive vehicles, including the continuing evaluation of commercial electric vehicles. Additionally, LeRC, for DOE, is developing the technology for practical gas turbine automotive vehicles engines.

General

Los Alamos Scientific Laboratory has worked on bomb- and explosion-containment vessel design for the FAA and other agencies.

URBAN AND REGIONAL TECHNOLOGY AND DEVELOPMENT

Fire Services, Law Enforcement, and Criminal Justice

Under ERDA's Technology Utilization Program, Lawrence Livermore Laboratory is helping the San Diego Police Department explore the usefulness of automated crime analysis by using computers to do pattern recognition. LLL demonstrated an experimental system and is assisting the San Diego police in the transition from the experimental system to an operational one. Tests have shown the system will be a time-saving, cost-effective tool for allowing the Police Department's available manpower to more effectively solve and prevent crimes.

Recent developments in fire fighting technology were demonstrated at a one day workshop meeting of the Fire Officers and Fire Fighters of the Fourth Naval District and local volunteer fire companies held at NADC. The meeting included presentations of NOMEX fire protection clothing, helmets, communications, infrared heat detecting equipment, helo rescue nets and lightweight oxygen systems. The majority of the items presented were spinoffs from Navy and NASA technical development programs.

NADC personnel served as technical advisors with the Philadelphia Mayor's Science and Technology Advisory Council and Pennsylvania Technical Assistance Program (PENNTAP).

Recreation

Los Alamos Scientific Laboratory used a rock-melting penetrator (Subterrene), for the National Park Service, to make drainage holes in a fragile archeological site.

General

The Night Vision Laboratory participated in numerous activities resulting in a continuous transfer of technology to the government and private sectors. Technology transfer activities have ranged from general briefings, demonstrations, technical assistance to loans of unique and specialized night vision equipment. Medical establishments, law enforcement agencies, universities, government and industrial research firms have sought guidance as to the application of night devices for the solution of their particular problems. Such night vision systems as the Handheld Thermal Viewer, Night Vision Goggles, Airborne Forward Looking Infrared Sensor, Handheld Searchlight, Starlight Scope and Night Observation Device were used in applications for night blindness, beach patrol, narcotics traffic, burglaries, forest fire detection, law enforcement, low income housing winterization, star guiding and astronomy and aircraft safety. Investigators also used night vision devices in the biological and behavioral aspects of the white tail deer, Haitian Hutia, sea turtle, rodent, chimpanzee, Greenburg and Pecan weevil and bird mortalities caused by atomic power plant construction.

STATE AND LOCAL GOVERNMENT PROGRAMS AT NUSC

The Naval Underwater Systems Center is continuing its active participation in efforts to expand the delivery of technology to state and local governments. NUSC is serving as a technology resource for the 27-city Urban Technology System. In that capacity, assistance is being provided to medium-size cities across the country. In addition, the New England Innovation Group is being aided in its efforts to develop a regional technology transfer program utilizing Federal laboratories, universities and the private sector to help solve problems at the state and local level.

A major expansion of the local government program has been achieved by utilizing the mobility provisions of the Intergovernmental Personnel Act (IPA) of 1970 to facilitate assignment of employees to directly assist state and local government. In November 1976, Robert B. MacDonald, a physicist at NUSC began a full time assignment as a technology transfer agent with the Connecticut Conference of Municipalities (CCM). This was the first time a NUSC staff member was assigned under the mobility provisions of the IPA.

Mr. MacDonald, whose assignment is partially sponsored by the New England Innovation Group, which is funded by the Division of Intergovernmental Science and Public Technology of the National Science Foundation (NSF), serves as a link between the public sector needs of the 169 towns in Connecticut and the technology resources that can meet those needs. For example, in the past 10 months, Mr. MacDonald has handled over 100 requests for assistance from local governments in such diverse areas as chemical analysis, cost evaluation, aerial photography, photography equipment, snow and ice control, records management, energy conservation, ultrasonic level detectors, soil mechanics, infrared scans, and reference materials.

One of Mr. MacDonald's major accomplishments has been the coordination of workshops for municipal officials. To date, three workshops have been held featuring speakers on police technology, energy conservation, and solid waste management.

Field tests of a computer program designed to improve snow removal techniques are currently being conducted through the technology agent at CCM. This program is a unique example of technology transfer to local governments because it involves the cooperation of several levels of government. Sponsored by NSF funding, technical personnel from both the Army Cold Regions Research and Engineering Laboratory and NUSC are working closely with representatives of 21 universities in Connecticut to examine and attempt to optimize snow removal and routing systems. Thirty-two municipalities in Connecticut have already expressed an interest in the program and the first phase of the project, data collection, has been initiated in these towns.

Gordon Preiss, a mechanical engineer at NUSC, is assisting the State of Connecticut Department of Planning and Energy Policy in the fields of solar energy and energy conservation. To encourage citizens to utilize alternative energy sources, Mr. Preiss is coordinating the installation of a solar energy hot water heating system at the governor's residence in Hartford, and has conducted workshops on energy conservation and use of solar energy for private citizens. He also assisted the New England Regional Commission in the formulation of a solar energy information center and a hot water initiative program with HUD.

William J. McGrath, a computer systems analyst at NUSC, is on assignment to the New York City Police Department Motor Transport Division to analyze the department's fuel dispensing system and evaluate the cost/benefit potential of automating, seimautomating, and revising existing manual procedures related to the dispensing of vehicle fuel. Phase I of the project, a study of the system currently in use, has been completed and a cost evaluation of an automated, on-line fuel dispensing system is being conducted in preparatory system implementation.

Vincent A. Mannion, a civil engineer from NUSC, has been detailed to the Rhode Island League of Cities and Towns (RILCT) to coordinate the efforts of the New England Innovation Group, Massachusetts League of Cities and Towns, and RILCT in introducing the Navy's building maintenance technology to local governments of Southern New England. Also, Mr. Mannion has been providing assistance to state and local governments in areas such as energy, water leakage, and emergency communication systems and equipment.

Ronald G. Heroux has been assigned as Executive Director of the Miami Valley (Ohio) Cable Television Council. He will serve as advisor to the Council and the Council's Board of Trustees and Government Technology Committee in their efforts to coordinate governmental, educational and community activities among the six cities in the Miami Valley, and to obtain grants leading to improved intercity cooperation via use of the cable television system, which includes a separate 38-channel two-way institutional cable connecting the city buildings, schools, hospitals, libraries and other public institutions. The system will provide an opportunity for intergovernmental service delivery activities such as computer services, coordinated fire and police training, and labor negotiation information in order to eliminate duplication and save money.

Ms. Margaret M. McNamara, a research and administrative associate for the New York State Assembly Scientific Staff in Albany, New York, has been assigned to the Office of Special Programs Development at NUSC. This represents the first time an assignment of this type has been made at NUSC.

Ms. McNamara serves as the assistant for state and local government programs under the NUSC Technology Transfer program. Her duties include conducting experiments to study the effectiveness of existing intergovernmental projects at NUSC and techniques utilized for implementing additional projects.

Another IPA assignment from NUSC is in the final phase of negotiation. This assignment will place a technology transfer agent under the Urban Technology System in the city of Springfield, MA.